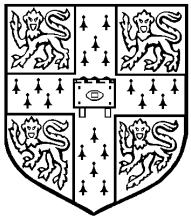

UNIVERSITY OF CAMBRIDGE

DEPARTMENT OF CHEMICAL ENGINEERING AND BIOTECHNOLOGY

INSTITUTE OF BIOTECHNOLOGY
TENNIS COURT ROAD SITE

SAFETY MANUAL
SEPTEMBER 2013

APPROVED BY THE HEAD OF DEPARTMENT

SIGNATURE……..

EMERGENCY INFORMATION

TO REQUEST EMERGENCY HELP

DAYTIME - TEL. RECEPTION 34160
OUT OF HOURS - TEL. SECURITY 101
EMERGENCY SERVICES - CAN BE CONTACTED ON 999

The building location is the Stem Cell / Biotechnology building, number E25 on the Old Addenbrooke's Site.

First Aiders:	**Tel. Ext.**
Ms C. Heinrich	48857
Ms L Hares	62313

GROUP HEADS	HOME	WORK
Professor C R Lowe	01799 599307	34157
Professor E A H Hall	01962 761081	34149
Dr. S Bahn		34151
Dr. G Christie		34166
Mrs. D. Singh		66707
Mr. R. Ansell		34147

FIRE

IF YOU **FIND** A FIRE.

- Raise the alarm by pressing the red call point on the stairs.
- Use the help numbers above to summon the fire brigade and local help.
- If safe to do so and you feel confident, fight the fire.
- Leave the building by the nearest exit and report the location of the fire to the Fire Safety Manager outside the front of the building on level 1.

IF YOU **HEAR** THE FIRE ALARM

- Leave the building by the nearest exit. Obey instructions from fire wardens and the Fire Safety Manager.
- Do not use the lift.
- Assemble at the front of the Judge Institute.

BUILDING / SERVICE / SECURITY PROBLEMS

DAYTIME - Contact the Institute technical team tel. 66707/34079
OUT OF HOURS - Contact Security tel. 31818

PREFACE

The University of Cambridge has a Safety Policy which is widely available. The University has a safety website which can be found at http://www.admin.cam.ac.uk/offices/safety/. The website has a wide range of safety advice and procedures. This handbook supplements the University information and is provided to help you work safely in the Department of Chemical Engineering and Biotechnology at the Institute of Biotechnology, Tennis Court Road Site. It is essential that you read the advice given here before you start work in the laboratories.

It is compulsory to perform risk assessments prior to starting any work in the labs. Risk assessment minimises the chance of problems occurring throughout your work. Accident prevention is mainly planning and common sense but safety in the laboratory does require constant vigilance and care. Always seek expert advice when in doubt about the safety of a practice.

Suggestions for inclusions or changes to future editions of this Manual, should be given to the Safety Representative for your area or the Departmental Safety Officer. This manual will be reviewed at least once every 2 years, to check for required alterations.

CONTENTS

RECORD OF SAFETY MANUAL DISTRIBUTION

A COPY OF THE SAFETY MANUAL CAN BE FOUND AT THE FOLLOWING LOCATIONS:

1. **The office of the Head of Department - Prof. N. Slater located at Pembroke Street Site.**
2. **The office of the Departmental Secretary (Academic) located in the Tennis Court Road, level 4 Reception area.**
3. **The Institute's general reception area.**
4. **The office of the Biological Safety Officer - Dr. G. Christie.**
5. **The office of Professor C. Lowe**
6. **The office of Dr. S. Bahn**
7. **The office of Prof. L. Hall.**
8. **The office of the Course Director for the Masters in Bioscience Enterprise. Dr Linda Allan**
9. **The office of the IT Manager - Mr. R. Ansell.**
10. **The Laboratory of the Laser Safety Officer.**
11. **The office of the Departmental Safety Officer, Tennis Court Road Site.**
12. **The office of the Departmental Safety Officer, Pembroke Street Site.**
13. **The Laboratory Room 405.**
14. **The Laboratory Room 412.**
15. **The Laboratory Room 413.**
16. **The Laboratory Room 318**
17. **The Write Up area Room 321.**
18. **The Laboratory Room 325.**
19. **The Laboratory Room 326.**
20. **The MBE Course Room 314.**

RECORD OF AMENDMENTS TO THE SAFETY MANUAL

AMENDMENT NUMBER	UPDATE ISSUED	AMENDMENT DETAILS	AMENDED BY	AMENDMENT DATE
1	AUGUST 2004	COMPLETE REWRITE	D. SINGH	August 2004
2	AUGUST 2009	TOTAL UPDATE ALL SECTIONS	D. SINGH	August 2009
3	JAN 2010	New risk assessment following fire	T. J. MATTHAMS	Dec 2009
4	DEC 2010	Update on high risk work section, UV and new Head of Department	D. SINGH	December 2010
5	Oct 2011	General Update	D. Singh	Sep 2011
6	Sep 2013	General Update, including alterations to laser and chemical safety sections	D. Singh	Sep 2013

SAFETY POLICY STATEMENT

Department of Chemical Engineering and Biotechnology
University of Cambridge

Health and Safety Policy Statement, August 2013

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1. General Statement of Policy

1.1. The Department of Chemical Engineering and Biotechnology is committed to safeguarding, so far as is reasonably practicable, the health, safety and welfare of staff, students and others who may be present in the Department, or affected by the Department's activities.
1.2. The Department recognises that full compliance with all aspects of legislation relating to health and safety, and with relevant University policy and procedure, is essential.
1.3. The Department recognises that competent health and safety management necessitates the allocation of appropriate resources, both in terms of money and in terms of staff time. The Department also recognises that health and safety management must be a core function of the management structure in the Department.
1.4. All persons present within the Department have a responsibility for health and safety and that they should look out for potential hazards and notify the appropriate person in authority of the nature and location of those potential hazards. Health and safety assurance relies on individual vigilance as well as on codes of practice and regulations.

2. Unification of Health and Safety Systems

2.1. The Department of Chemical Engineering and Biotechnology currently occupies three separate sites, those sites being located on Tennis Court Road, on the University New Museums Site (Pembroke Street site) and at the Cavendish Laboratories (Magnetic Resonance Research Centre).
2.2. Each site of the Department will continue to operate according to the safety policies and procedures for that site as they existed on August 1st 2008 unless and until those policies and procedures are superseded.
2.3. The Department will continue to unify safety policy and procedure across its different sites as and when it becomes practicable and beneficial to do so.

3. People and Responsibilities

3.1. The Head of Department has overall responsibility for health and safety within the Department.
3.2. The Head of Department delegates the daily management of health and safety within the Tennis Court Road site to the Director of the Institute of Biotechnology.
3.3. The Head of Department delegates the daily management of health and safety within the Magnetic Resonance Research Centre (MRRC) to the Manager of the Centre.
3.4. The Departmental Safety Officers advise the Head of Department, the Director of the Institute of Biotechnology, the Manager of the Magnetic Resonance Research Centre and all other members of the Department, on health and safety issues. They also conduct accident investigations, administer the safety inspection programme and maintain various other safety-related management systems.
3.5. The Assistant Safety Officer (MRRC) advises the Head of Department, and the Manager of the MRRC, on safety issues which relate directly to the MRRC.

3.6. The Fire Safety Managers are responsible, in liaison with the University Fire Safety Unit and the University Estate Management department, for the management of fire safety matters. The Deputy Fire Safety Managers support them in this function.
3.7. Research Supervisors are responsible for managing the safety of all Research Workers who are supervised by them or who have been allocated to them. The term Research Workers includes students, post-doctoral researchers, academic visitors and technicians.
3.8. The Department considers that the promotion of safe working is an essential duty for all Research Supervisors.
3.9. All Research Supervisors are required to issue a Lab Management and Safety Plan which details how safety is managed within their specific research group or area.
3.10. Research Associates are expected to oversee the daily activities of any Research Workers who have been allocated to them, and to bring any safety-related problems which cannot be readily resolved to the attention of the relevant Research Supervisor.
3.11. The responsibility for laboratory safety and house-keeping problems which cannot be attributed to the activities of any particular known research group lies with the member of staff having overall responsibility for the laboratory in question.
3.12. The responsibility for managing the safety of activities which take place off-site away from the Department's buildings rests with the manager or Research Supervisor of the individual working away. In the case of placements at host organisations, the manager or Research Supervisor of the individual working away will, so far as is reasonable, co-ordinate and co-operate with the host organisation in order to safeguard the individual.
3.13. The Buildings Safety Officer is responsible for liaising with the University Estate Management department over matters relating to the safety of the buildings.
3.14. The Section Heads are responsible for safety in the day-to-day work of their Section members and for the safe functioning of work carried out by their Sections.
3.15. The Head of Department, Director of the Institute of Biotechnology, Manager of the Magnetic Resonance Research Centre and Departmental Safety Officers liaise with the University Health and Safety Office for advice relating to health and safety.
3.16. The role of a Radiation Protection Supervisor is to ensure that all relevant local rules are followed.
3.17. The role of a Laser Safety Officer is to ensure that all relevant local rules are followed and to provide advice on the safety of work with lasers.
3.18. The Biological Safety Officers are responsible for advising on the safety of work with biologically hazardous materials and genetically modified materials within the Department. The Deputy Biological Safety Officers support them in this function.
3.19. The Laboratory Section Heads are responsible for maintaining in a safe state laboratory equipment which is not under the control of any specific Research Supervisor or University Teaching Officer.
3.20. The Chief First-Aiders are responsible for the provision of first-aid materials and services.
3.21. The Electrical Safety Adviser is responsible for advising on the safety of electrical and electronic equipment, and, to the extent that they may be competent to do so, of electrical installations.
3.22. The Chemical Safety Group is responsible for advising on the toxicity and health effects of chemicals and nano-particles.
3.23. The Dangerous Substances Advisers are responsible for advising on the physical hazards of substances, including flammability and explosivity.
3.24. The Asbestos Co-ordinators are responsible, in liaison with the University's Estate Management department, for co-ordinating the Department's response to building-related asbestos risks.
3.25. The Insurance Register Co-ordinators are responsible for maintaining records which relate to the statutory inspection of pressure systems and lifting equipment, and for managing any necessary response to those statutory inspections.

3.26. The Departmental Catering Co-ordinators are responsible for advising on food safety and for maintaining records relating to food safety management.
3.27. The Safety Management Team comprises the Head of Department, the Director of the Institute of Biotechnology, the Manager of the Magnetic Resonance Research Centre, the Departmental Safety Officers, the Departmental Secretary (Resources), the Departmental Secretary (Academic Matters), the IoB Laboratory Manager and the Assistant Safety Officer (MRRC). This is an executive group which meets regularly to consider health and safety management issues.
3.28. In circumstances of serious and imminent danger, all members of the Safety Management Team may act with the full delegated authority of the Head of Department.
3.29. The Safety, Health and Environment Committee meets regularly to provide a forum for the discussion of safety issues. The Biological Safety and Genetic Modification Committee meets at least once per term (and additionally as required) to provide a forum for the discussion of biological safety and genetic modification issues. The Chairmen of the respective Committees are responsible for their proper operation.
3.30. The Chemical Waste Co-ordinator for each site is responsible for managing and co-ordinating chemical waste disposal procedures on their own site.
3.31. Senior Markers are responsible for ensuring the health and safety of teaching experiments under their control.
3.32. Demonstrators and Markers in teaching laboratories are responsible for day-to-day supervision of students as they carry out teaching experiments.
3.33. Persons giving lectures are responsible for the safety of any practical demonstrations which take place during those lectures.
3.34. The maintenance of a safe working environment requires the active participation of all persons present within the Department. Everybody has a responsibility to do everything that they reasonably can to prevent injury to themselves and others, and to prevent loss to the Department. The Department requires everyone to follow specific instructions given in current safety policies and procedures.
3.35. It is forbidden for any person to intentionally interfere with, or misuse, any equipment provided by the Department for the purposes of health and safety.

4. Recruitment, Training, Information and Supervision

4.1. When recruiting new members of staff (at all levels) and when accepting new Research Workers, consideration shall be given to ensuring that they have the necessary skills and aptitude to carry out their work safely.
4.2. The Department is committed to ensuring that all employees, students and other persons (for example academic visitors) who undertake any given activities, including conducting experimental research, have adequate training, instruction and supervision to carry out those activities safely.
4.3. The Department is committed to ensuring that safety-related information is properly disseminated to all those for whom it is relevant.
4.4. The Department is committed to appointing and consulting competent advisors in health and safety.
4.5. The Department is committed to keeping abreast of current developments in the field of health and safety.

5. Planning, Monitoring and Review

5.1. The Department is committed to improving standards of health and safety, and recognises that a good health and safety management system will seek to continually raise standards.
5.2. The Department considers health and safety to be a core issue when planning new ventures and future projects.
5.3. The Department recognises the need to regularly monitor its current levels of health and safety performance, and to react appropriately. The Department also recognises the need to regularly review policy and procedure.
5.4. The Department will produce an annual report on health and safety management which will be supplied to the University Health and Safety Office and the School of Technology.
5.5. This Health and Safety Policy Statement will be reviewed on or before 1 August 2014.

6. Health and Safety Management Structure

6.1. The health and safety management structure within the Department will be the same, in all respects, as the general management structure.

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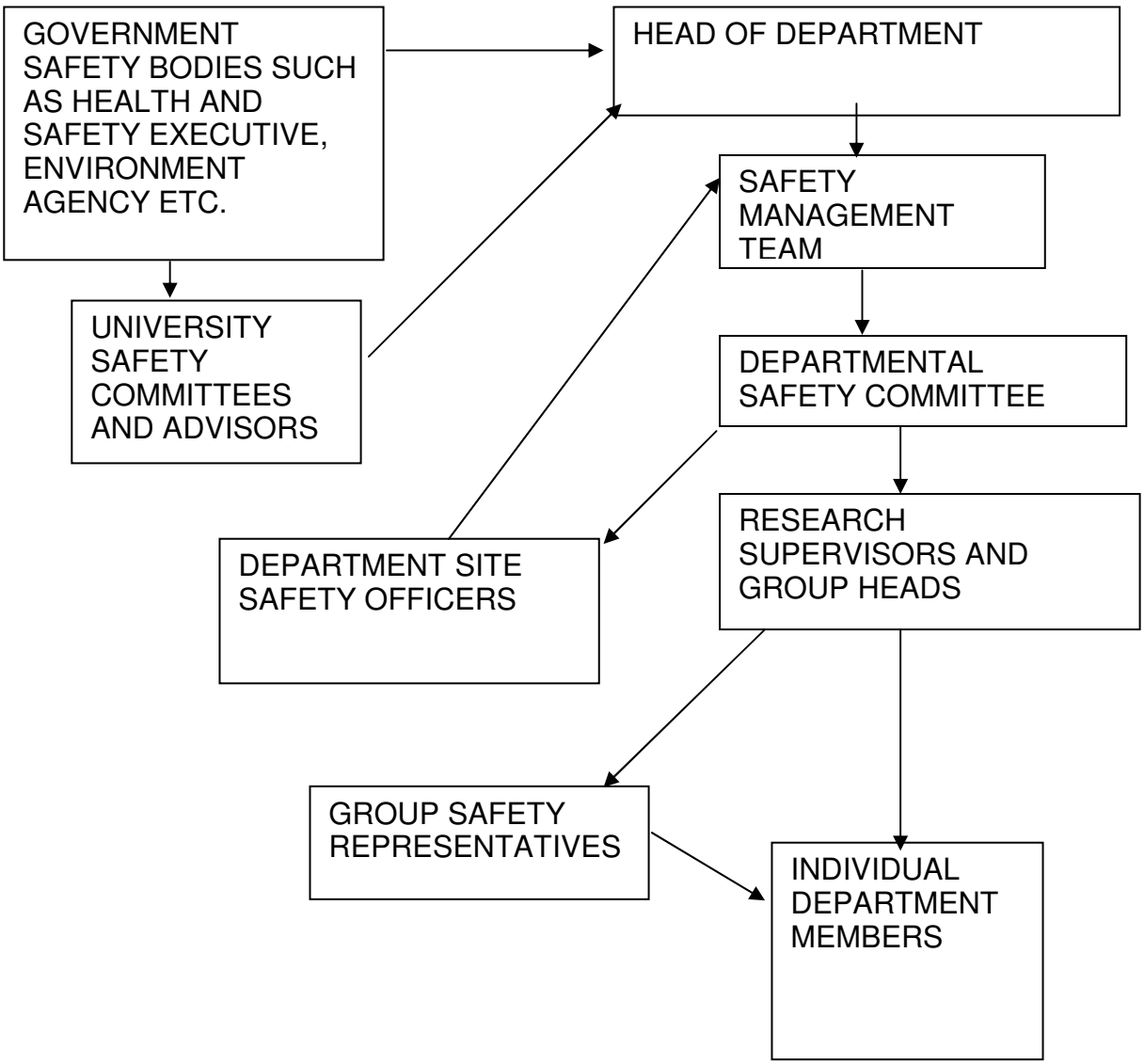
Prof Nigel K H Slater
1 August 2013

DIAGRAM TO SHOW ORGANISATION CHART FOR SAFETY



Information on safety is expected to flow both ways at all levels of the organisation in the University.

To give effect to the safety policy the Department has made the following arrangements:

1.1 HEAD OF DEPARTMENT (HOD) - PROFESSOR NIGEL SLATER.

The Head of Department's responsibilities include ensuring the following:

1. Consideration of health and safety during the long term planning for the Department.
2. Overseeing systems to ensure that research within the Department is conducted safely.
3. Ensuring that a written statement exists of the Department's Safety Policy, and that safety procedures are in place and the rules formulated to control the hazards present in the Department.
4. Institution of the appropriate Safety Committees.
5. Making sure that the equipment, services and fabric of the Department are maintained in a safe condition.
6. Ensuring that safety inspections are made so that all the Department areas are inspected annually.
7. All accidents and incidents are reported, in accordance with the reporting procedures.
8. All accidents and incidents are investigated adequately, to minimise the chance of recurrence.
9. All Department members understand the Department's fire precautions and procedures.
10. The Department's co-operation with the University in provision of First Aid and safety training.
11. Any rules made by the University and Department are understood and observed by all Department members.
12. Appointment of the Department Safety Officers in writing. Ensuring that Department Safety Officers are carefully selected and that they fulfil the responsibilities of their posts.
13. Ensuring that the duties and responsibilities related to safety, are explained to all Department members.
14. Facilitating consultation between the staff and representatives of the Department for the purpose of reviewing existing safety practices and, in particular, for the introduction of new safety measures.

1.2 THE SAFETY MANAGEMENT TEAM

The Safety Management Team consists of the following staff:

- The Head of Department
- Director of the Institute of Biotechnology
- The Manager of the Magnetic Resonance Research Centre
- The Departmental Safety Officers - all 3 sites.
- The Departmental Secretary (Resources)
- The Departmental Secretary (Academic Matters)
- The IOB Laboratory Manager

This is an executive group which meets approximately once every term to consider health and safety management issues. At the meetings, the Departmental Safety Officers report on any safety issues requiring consideration by the Department for policies, planning or resources.

The members of the safety management team are responsible for:

1. Demonstrating their personal commitment to health and safety at work.
2. Engaging the interests and concerns of all persons under their supervision to use good health and safety working practices.
3. Ensuring that all reasonable safety equipment, demonstrated as required by risk assessment, is available and is used.
4. Advise on the safety training required by new starters, or people changing the type or nature of their work.
5. Ensuring that the Department keeps records, of the safety training, that the staff receive.
6. Instructing staff under their supervision, in safe working practices.
7. Advising staff on the completion of risk assessments for work, prior to commencement of that work.

1.3 DEPARTMENTAL SAFETY COMMITTEES AND ADVISORY GROUPS

1.3.1 THE SAFETY HEALTH AND ENVIRONMENT (SHE) COMMITTEE

The Department has established a Safety Committee, which reflects participation from all sites of the Department and from all areas of the buildings. This Committee has an advisory and consultative function for the Head of the Department. The Department Safety Committee is advised, as necessary, by the University Safety Committee and Officers.

The Safety Committee meets at least once per term but more normally about 5 times a year and the Committee reports to the Head of the Department. The objectives of the Safety Committee are:

- To promote the effective co-operation of all members of the Department in maintaining safety.
- To act as a forum to raise and discuss any safety issues.
- To keep under review the measures taken by the University and the Department to ensure health and safety at work.
- To disseminate information about safety including.
    - Reports prepared by the University Committee for Safety.
    - Recommended changes or new measures made in the light of such reports.
    - University policies and safety leaflets.
    - Other safety rules and regulations both new and existing.
- To ensure that accidents and incidents in the Department have been fully reported and investigated. Where necessary to decide on corrective actions highlighted by any accidents or incidents.
- To action any improvement notices received from Inspectors under the Health and Safety at Work Act.
- To analyse the reports of results of safety tours and inspections of the premises, plant and processes. To check that corrective actions have taken place.
- Members are required to attend the safety meetings, or if this is not possible, to send a substitute to represent them.
- Members are required to disseminate information from the group or specialist area that they represent to the Safety Committee and vice versa.

1.3.2 THE BIOLOGICAL SAFETY COMMITTEE

The Biological Safety Committee has an advisory and consultative function for the Head of the Department. The Department Biological Safety Committee is advised, as necessary, by the University Biological Safety Committee and Officers.

The Biological Safety Committee meets regularly, at least once a term but more normally about 5 times per year.

- To promote the effective co-operation of all members of the Department in maintaining biological safety.

- To act as a forum to raise and discuss any biological safety issues, including work done under the guidelines of the ACDP (Advisory Committee on Dangerous Pathogens), SAPO (Specified Animal Pathogen Order), or SACGM (Scientific Advisory Committee on Genetic Modification.
- It is also a forum to raise and discuss any matters covered by the HTA (Human Tissue Authority).
- To keep under review the measures taken by the University and the Department to ensure health and safety at work, when handling biological materials.
- To receive, check, and approve, biological risk assessments, for work at containment level 2 or higher, and for genetic modification work.
- To aknowledge risk assessments for work at containment level 1, which have been approved by the Biological Safety Officers and their Deputies.
- To disseminate information about biological safety.
- To ensure that accidents, and incidents that have happened in the Department, with a biological component t, have been fully reported and investigated.
- To check the "Biological Spillages Books" to review any biological spillages where loss of containment has occurred.
- To decide, where necessary, on corrective actions highlighted by any biological spillages, accidents or incidents.
- Members are required to disseminate information from their group or area that they represent, to the Biological Safety Committee and vice versa.

1.3.3 THE CHEMICAL SAFETY ADVISORY GROUP

The Departmental Chemical Safety Group, advises on risk assessments for work which carries a very high chemical risk (and also for chemical work requiring special licences). The Group may also be called upon, to investigate accidents and to comment on policy and procedure. The Group is made up of experienced volunteers who can assist with offering advice.
The Group currently consists of:
Sarada Crowe, Deborah Singh, Roz Williams, Peter Foreman, Mick Mantle and John Hulme (from the Safety Office).

1.4 THE SAFETY OFFICERS OF THE DEPARTMENT

1.4.1 DEPARTMENTAL SAFETY OFFICERS (DSO)

The Departmental Safety Officers are appropriately trained and qualified members of the Department Safety Committee with access to senior management (Head of Department) responsible for:

1. Acting as the Department's principal contact in relationship with the appropriate regulatory bodies, the Safety Office, The Health and Safety Executive, and the Environmental Agency (Apart from radioactive work see section 1.4.4.)
2. To carry out any delegated tasks from the Head of Department with respect to safety supervision, management and administration.
3. Advising the Head of Department on all matters relating to hazards and associated safety of Department staff and external contractor and visitors to the Site that they represent.
4. Attending the regular meetings of the Department Safety Committees.
5. Ensuring that minutes are circulated and resulting actions are implemented and enforced within the Institute.
6. Provision of consultation on any safety matter within the Department.
7. Organising the receipt of appropriate training for all concerned with specific hazards and safety officer roles.

8. Ensuring that any changes in safety legislation are propagated to Safety Officers and Department members.
9. Overseeing procedures to prevent entry into restricted areas (other than in an emergency) for cleaning, servicing of equipment or activities outside the normal working of the laboratory unless a responsible member of staff has previously been informed, and the area has been made safe.
10. Act as a point of contact in the absence of any of the other Departmental Safety Officers.
11. In the absence of the DSO for the Tennis Court Road Site one of the other DSO's performs the above duties.

1.4.2 BIOLOGICAL SAFETY OFFICER (BSO)

The Departmental Biological Safety Officer is an appropriately trained, and qualified member of the Department, experienced in the biological project areas undertaken within the Department. The BSO is a member of the Safety Committee, with access to senior management (Head of Department) responsible for:

1. Advising the Head of Department in all matters relating to the containment of biological hazards and the associated safety of the Department members.
2. Advising the Head of Department in all matters relating to genetic modification work and the associated safety of the Department members.
3. Screening any new user in this area, to check for a proper understanding of the rules, procedures, correct use of laboratory equipment and provision of appropriate training.
4. Advise on and review, all Department risk assessments with a biological hazard content; If necessary, in consultation with the Biological Safety Committee.
5. Checking that all new members are supervised, by a responsible member of the relevant group.
6. Overseeing procedures to prevent entry into restricted areas (other than in an emergency) for cleaning, servicing of equipment or activities outside the normal working of the laboratory, unless a responsible member of staff has previously been informed and, in containment level 2 or above, that the area has been made safe.
7. Checking that a responsible member of staff in charge of an experiment is a) answerable at all times to the BSO for the safe execution of work in progress and b) responsible for ensuring the day-today cleanliness of the lab.
8. Advising on the appropriate protective clothing to be worn in the containment area and safety cabinets as per the risk assessment.
9. Checking that protective clothing used in the containment laboratory is not worn outside the facility.
10. Checking that local rules are followed.
11. Ensuring appropriate training in microbiological practice.
12. To ensure that there are written procedures and materials for dealing with spillages and to assist in the cleaning of spillages in emergency situations.
13. To keep a record, of any biological spillages that have occurred.
14. Safe storage of microbiological organisms, particularly pathogenic or potentially pathogenic material.
15. Liaising with Occupational Health, where health screening, advice or inoculations are necessary.
16. Overseeing procedures to check that areas are appropriately disinfected where necessary, including for the entry of maintenance personnel, cleaners or external contractors. Provision of supervision in situations where there is a risk to people unaware of the inherent dangers who have to work in these areas.
17. Be familiar with the University's Health and Safety Policy.

1.4.3 CHEMICAL SAFETY ADVISOR AND CHEMICAL WASTE CO-ORDINATOR

The Departmental Chemical Safety Advisor is an appropriately trained, and qualified member of the Department.

1. Advising the Head of Department in all matters relating to chemical hazards and the associated safety of the Department members.
2. To ensure there are written procedures and materials for dealing with spillages and to assist in the cleaning of spillages in emergency situations.
3. To offer help and advice to anyone considering work with high risk chemicals, as identified in Section 2.3 of this Manual, on High Risk Work.
4. Is a member of the Departmental Chemical Safety Advisory Group, who assist in reviewing work of a high chemical risk.
5. Advising the "Chemical Waste Co-Ordinator " of the Department.
    - The "Chemical Waste Co-Coordinator " acts as a liaison between the Safety Office the University Waste Disposal Service and the member of the technical team designated to deal with the waste.
    - The "Chemical Waste Co-Coordinator "offers safety advice for disposal of waste chemicals.
    - The "Chemical Waste Co-Coordinator " checks the final lists of waste submitted to the University Waste Disposal Service for disposal as chemical waste to ensure that both the University's and the Department's waste disposal policies have been followed.

1.4.4 RADIATION PROTECTION SUPERVISORS

The RPS's for the Department are appropriately trained and qualified members of the Department Safety Committee, with access to senior management (Head of Department).

1. Answerable to the Head of Department so far as the safety of work involving the use of radioisotopes is concerned. To act as the Department's principal contacts in relationship with the appropriate regulatory bodies, the Safety Office, The Health and Safety Executive and the Environment Agency in matters of radiation safety.
2. The Department currently does not handle open radioactive sources within the departmental buildings but the Radiation Protection Supervisors must have the knowledge indicated below to advise members of the Department considering working with radioactivity.
3. To propose and draw up systems for management and control of radioactive isotopes and wastes within the Department according to the regulatory requirements.
4. To produce Department documents describing these systems. These documents will be created with a word processor, and carry version numbers and dates. They will carry the signatures of the author and the Director of the Department. These procedures will be reviewed and updated with every change in legislation.
5. To provide an annual review of radiation safety to the safety Committee.
6. To approve the acquisition of all radioactive materials and to signify this in writing by means of a counter-signature on the authorisation to acquire radioactive materials. Before authorising acquisitions, the RPS must ensure that the Department's certificate of registration will not be breached and that any radioactive wastes generated can be disposed of within the provisions of the existing certificates of authorisation, or under exemption.
7. To allocate monthly limits, and an overall holdings limit for each specific isotope registered for the Department. Within that limit, the RPS can authorise, purchase and register these in the Master Record Book.

8. To receive the monthly source and waste reports from the delegated staff and use these to compile the monthly summaries of holdings of registered substances, authorised accumulated waste and waste actually disposed of in each month.
9. Provision and maintenance of suitable facilities for safe-keeping and use of radioactive substances and appropriate arrangements for handling of radioactive wastes created within the Department.
10. Ensuring that all Department personnel involved with handling radioactive isotopes are adequately trained, issued with radiation badges, and made aware of their duties for handling radioactive isotopes and radioactive wastes created in the Department.
11. Ensuring adequate accounting for radioactive isotopes and radioactive wastes within the Department, including provision of monthly reports.
12. Responsible for management and recording of the disposal of radioactive wastes by approved routes.
13. Overseeing procedures to provide protection of maintenance staff, cleaners, external contractors and workers who may be required to work within the areas designated for the handling of radioisotopes and radioactive wastes.
14. Provide advice and guidance in the event of a spillage or accident involving radioactive substances.
15. Advise on, help compile and review, all radioactive risk assessments for the Department.
16. Ensure that risk assessments are sent for appropriate review and signature by the university RPA (Radiation Protection Advisor).
17. Advise the Head of Department on the appointment of other suitably qualified staff to undertake support work such as monitoring areas, administering badge distribution and dealing with radioactive waste.
18. To check that orders are within the acceptable storage and holding levels in accordance with certificates for each isotope.
19. To check that disposal records are within acceptable disposal limits for each isotope, according to the certificates held.
20. Assist with the training of new radioactive workers.
21. Reports any infringements of procedures to the Head of Department.
22. Supervises the work of staff carrying out radioactive support work.

1.4.5 ELECTRICAL SAFETY OFFICER (ESO)

The Department Electrical Safety Officer (ESO) is a suitably qualified member of staff who sits on the Safety Committee. The responsibilities include:

1. Provision of help and advice to people bringing electrical items into the Department.
2. Monitoring safety of all electrical equipment other than fixed installations and wiring.
3. Liaising with Estate Management for safety of fixed installations and wiring.
4. Supervising annual Portable Appliance Testing (PAT) of electrical equipment.
5. Supervising the recording of results of PAT testing.
6. Checking electrical safety of items brought into the Department.

1.4.6. LASER SAFETY OFFICER

The Departmental Laser Safety Officer is an appropriately trained, and qualified member of the Department, experienced in the laser project areas undertaken within the Department. The LSO is a member of the Safety Committee with access to senior management (Director) and responsible for:

1. Identifying laser systems and monitor the use of lasers at the Department of Biotechnology.
2. Advising on new equipment being brought into the Department containing lasers.
3. Implementation of the measures prescribed by the University Laser Safety Manual regarding risk assessment, local rules documents, and user training.
4. Supervise maintenance engineers accessing laser equipment and ensure that all safety procedures are followed.
5. Accept notification of all work on lasers by either engineers or individuals, that could alter the risk assessments and check that the risk assessments have been updated accordingly.
6. Completion of adequate documentation, recording safety procedures which have been implemented.
7. Checking that necessary engineering precautions are put in place.
8. Ensuring completion of the annual return for the University Safety Office, listing lasers at the Department of Biotechnology.
9. Checking that completed and signed risk assessments exist for all Class 3B and Class 4 lasers.
10. Ensuring that any new or out of use lasers are not made operational until they have been installed, had a subsequent risk assessment and local rules documentation has been generated.
11. Identifying any new equipment containing UV light sources and recording them on the Site list of UV sources.
12. Helping in the performance of UV safety calculations and advising on safe working practices.
13. Help and advise on other safety issues relating to optical radiation such as visible light and infra-red radiation.

1.4.7. FIRE SAFETY MANAGER

The responsibilities of the FSM are:

1. Administration, appointment and training of fire sweepers / fire marshals and members.
2. Audit and assessment of potential fire risks within the Department, provision of fire extinguishers, and blankets.
3. Liaison with Stem Cell Department for regular fire drills
4. Ensuring that all fire extinguishers which have been used are sent for testing and refilling.
5. Collect room evacuation cards and liase with the fire brigade in the event of an emergency evacuation.
6. Provision of advice on activities within the Department to minimise fire risks.
7. Liaison with the fire Safety Office for completion of the building fire risk assessment.
8. Attending regular Fire Manager Safety Training at least once every two years.
9. Checking that fire wardens have attended fire safety training.
10. Liaising with the University Fire Safety Office to organise an annual fire safety training event for staff.

DEPUTY FIRE SAFETY MANAGER

In the event of an emergency evacuation and the absence of the FSM, would deputise for the collection of room evacuation cards and liaison with the fire brigade.

1.5 GROUP HEADS

Research Supervisors are responsible for the people carrying out Research under their direction. They are responsible for:

1. Demonstrating their personal commitment to health and safety at work.
2. Engaging the interests and concerns of all persons under their supervision to use good health and safety working practices.
3. Ensuring that all reasonable safety equipment, demonstrated as required by risk assessment, is available and is used.
4. Identifying safety training required by new starters or by people changing the type or nature of their work.
5. Ensuring that staff, keep records of the safety training that they receive.
6. Instructing members of their research groups and other associated staff under their supervision, in safe working practices.
7. Assisting staff to complete risk assessments of work prior to commencement of that work.
8. Reviewing and monitoring risk assessments and checking that they are updated regularly.
9. Checking that control measures identified as being required by the risk assessments are actually being used by members of their Group.
10. Prepare and issue a Lab Management and Safety Plan once per year that details how safety is managed within their specific research group or area.

1.6 GROUP SAFETY REPRESENTATIVES

The Department Group Safety Representatives are responsible for:

1. Attending the Safety Committee Meetings
2. Ensuring that any safety issues in their specific laboratories / work locations, are brought to the attention of the appropriate Safety Officer at the Safety Committee Meetings.
3. Propagating good laboratory practice, University and Department safety procedures and practice, within their own laboratories, and among their own colleagues.
4. Feeding back to their group, safety information discussed at the Safety Committee meetings.

1.7 ALL STAFF

All employees of the university and students have a responsibility to themselves and others to:

1. Carry out their work with due regard to health and safety.
2. Adhere to and actively support the University and Department's safety rules and procedures.

3. Inform themselves of the foreseeable safety and health hazards of the equipment and materials with which they are concerned.
4. Ensure that they consider the hazards of materials prior to purchasing or bringing them into the Department.
5. Bring to the notice of supervisors any potential hazards to safety and health of which they know and learn, whether in routine work, or arising from faults in equipment.
6. Always wear laboratory coats and other personal protective equipment identified as required by the risk assessment.
7. Never carry out work unless they have read and signed an existing risk assessment or have written a risk assessment for new work.

1.8 STAFF FROM EMBEDDED COMPANIES

All staff working with embedded companies in the Department, must comply with all the safety rules of both the University and the Department. The Departmental Safety Officer for the site must be consulted, if additional safety rules, are required to be adhered to, by staff working for that embedded Company.

1.9 VISITORS

All visitors to the Department, must abide by the Health and Safety rules of the Department. Daily visitors are given a Visitor's safety leaflet at the Institute's Reception desk and are requested to sign in and out. They are given a visitor's badge to identify them. For short term staff visitors, staying for less than 4 weeks, safety can be explained by the Group Head, as long as the visitor does not work unattended or out of hours. If staying for longer, or if requiring to work unaccompanied, the staff visitor must undergo the Induction Safety Training provided by the Department. All visitors should be notified to the Department Reception before they arrive.
Due to Insurance issues, Children are of particular concern, they may be shown the laboratories but must not be allowed to enter and work in them, due to the risks of the hazardous work within them. In general, Children are forbidden in the laboratories, unless brought in by an organised work placement or educational scheme. Children wishing to work in the laboratories under those schemes must have individual risk assessments carried out for them.

1.10 CONTRACTORS

Contractors are a high safety risk. This is because contractors may intend to carry out work on equipment or areas, which may be contaminated from the laboratories. The work carried out by contractors, may have safety implications for staff using the equipment or areas. All contractors must enter in as daily visitors, as explained in point 1.8 above. All contractors must be organised through the Technical Team, mainly to address safety issues but also to deal with general issues such as parking and locating the building. A member of the technical team, who understands the hazards of both the area to be worked in and the nature of the work to be carried out, must then show the Contractors to the work area. The work must be risk assessed. In the event of no technical team member being available, only a senior member of staff, familiar with the hazards of the area may show them in. This is particularly important for visitors requesting access to the plant rooms, where the intricate building engineering safety controls are situated. Some areas or equipment, may require that a "Permit To Work" be issued prior to commencement of the work.

1.11 DISTRIBUTION OF SAFETY INFORMATION

- The Department's Safety Policy and Safety Manual, are given to each member of staff as they start.
- University safety policies and procedures for specific areas of safety, are freely available electronically via the University's Safety Website. This site can be found at www.admin.cam.ac.uk/offices/safety. It is recommended that all staff familiarise themselves with this site. All the policies and procedures of the University and many helpful links are present on the website.
- The Safety Office information can be accessed from the Department Website.
- Distribution of information will also be by paper copies displayed on the safety notice board, with copies being kept by the Departmental Safety Officer.
- Paper copies are distributed where necessary to Research Supervisors and Safety Officers.
- In addition safety changes and safety messages will be notified by e-mail to all members of the Department using the everyone@biotech.cam.ac.uk e-mail address. It is very important that you read these messages and alert anybody who you know has not received the message.

1.12 MANAGEMENT OF SAFETY TRAINING

1 All staff and visitors staying in the Department for longer than 4 weeks must undergo a safety induction training course, provided by a competent person who is normally one of the Departmental Safety Officers.
2 Graduate students will in addition, attend the Induction Safety course run by the University.
3 Safety training will be in at least two stages. Stage 1 is the initial induction safety training as the person starts in the Department, which is given by one of the DSO's. The second stage follow - up training is given as the person starts work and continues as necessary for their work. Second - stage training is given by a mixture of the Group Head, other competent research staff, and University provided specialist training.
4 A record of the induction training, is held by the Site Departmental Safety Officer.
5 A record of the follow-up training, is held by the individual, and is recorded on their Personal Safety Training Record Sheet.

SECTION 2 ARRANGEMENTS FOR SAFETY

2.1 SAFETY TRAINING

1. All new staff will be given a "Personal Safety Training Record" form. This is used to record any safety training. The Training Record form, lists some of the other areas of safety in which the staff member may require additional training before they start work in the laboratories. The individual's Supervisor will identify areas where this additional training is necessary. Depending on the nature of the work to be carried out, further safety training will be provided as necessary. These may include:
    - Use of radioactivity. Training provided by the University, (note that open sources are not currently handled in the Department).
    - Use of lasers. A University run course, followed by in-house training.
    - Use of large centrifuges. In-house training. A course is also available provided by manufacturers of the larger centrifuges.
    - Use of the autoclaves. In-house training.
    - Use of the synthesis lab. In-house training.
    - Use of cryogenics. In-house training.
    - Use of safety cabinets. A University run course, followed by In-house training.
    - Use of UV light sources. In-house training. A University run course is also available.
    - Other techniques and use of equipment, will be demonstrated by competent staff, as appropriate.
    - Certain large pieces of equipment, either have special safety considerations or are very complicated. Training is required prior to operation of complex equipment. These items may well have Standard Operating Procedures written for them.
    - Remember that general safety issues such as manual handling and the set up of a VDU workstation, must also be considered.
    - The training record sheet should be reviewed if the work changes.

2.2 RISK ASSESSMENT

1. It is a legal requirement that **before commencing any work,** you make an assessment of the risks involved in that work and how you will control these risks.
2. This assessment must be recorded in writing and signed by you.
3. It must then be approved and signed by your supervisor.
4. The risk assessment must be reviewed and updated regularly and if any changes are made to the procedure, the risks must be reviewed.
5. When writing a risk assessment start with the Department's standard risk assessment form "Form 1" which may be sufficient for simple low risk procedures.
6. For higher risk work, a more detailed risk assessment using specialist forms may be required and these forms are attached to form 1. This includes working with lasers, toxic chemicals or working with genetically modified organisms, a specialised form can be obtained from the Departmental website or if in doubt consult the Departmental Safety Officer.
7. Higher risk work, may involve an approval step by one of the Department's Safety Committees or Officers, which is detailed on Form 1.
8. A paper copy of the risk assessment must be kept in the risk assessment folder for your Group, although the original can be held on computer.
9. Risk assessments are numbered sequentially per Group, starting with the group Heads 3 initial letters then 0001 onwards.
10. Note that risk assessment must be done prior to ordering any substances to carry out your work, as this may alter what you eventually order.

11. The risk assessment must be immediately available as it may be requested to be viewed by staff or safety inspectors at any time.
12. Remember that risk assessment is not just about the control of substances hazardous to health but also includes other risks such as electrical hazards, trip hazards etc.
13. Help and advice is available in the form of a risk assessment booklet which can be found on the University Safety Office website and/or from your Group Head.

2.3 HIGH RISK WORK

Some areas of work are more dangerous than others and or require to be licensed, and therefore special permission has to be obtained to carry them out.

1. Obtaining permission is co-ordinated through the Departmental Safety Officer, who seeks advice from the Department Safety Committee, the Departmental Chemical Advisory Group, the University Safety Office, or Occupational Health as appropriate.
2. Examples of such work include:
    - Work with sensitisers, carcinogens, mutagens and substances toxic to reproduction, as identified by R phrases R42, R43, R45, R46, R49, R60, R61, R64 or hazard phrases H334, H317, H350, H340, H350i, H360f, H360d, H362.
    - Work with chemicals classed as highly toxic, shown by risk phrases R26, R27, R28, R39 or any combination of those. This includes chemicals such as cyanide.
    - Work with class 3B and 4 lasers.
    - Work with UV sources of light
    - Work with animals or insects.
    - Work with blood or human samples which apart from safety considerations, may also be covered by the Human Tissue Authority or the Human Fertilisation Act and may require a licence.
    - Work with tissue cultures or samples that could contain polio.
    - Work with organisms or materials, of class 2 or higher, as classified by one or more of the following bodies, the ACDP (Advisory Committee on Dangerous Pathogens), the SACGM (Scientific Advisory Committee on Genetic Modification) or SAPO (Specified Animal Pathogen Order).
    - Work using substances mentioned in Schedule 5 of the Anti Terrorism Crime and Security Act, which covers a range of chemicals, toxins and organisms, which could be used for acts of crime or terrorism.
    - Any substance classified officially as VERY TOXIC.
    - Work with poisons in schedule 1.
    - Cytotoxic drugs, or other pharmacologically active compounds.
    - Toxic gases used at concentrations considered to be fatal by inhalation.
    - Any pyrophoric substance (R17 or H250) including alkyl lithiums, alkyl boranes, silane gas.
    - Explosives.
    - Organic compounds of mercury.
    - Organophosphorous compounds which are environmental poisons.
    - Hydrofluoric acid.
    - Substances capable of causing cyanide poisoning.
    - Any unsealed radioactive materials.
    - Any reactions expected to give rise to the substances listed above as intermediates or products, except where those substances are immediately extracted away and discharged above roof height.
    - Any work involving engineered free nano-particles where those particles could potentially become airborne, and/or where aerosolisation could occur (for

example when freeze-drying). Nano-particles which are embedded or in suspension / aggregate/ slurry etc. are not included.

- A significant amount of an asphyxiant which, if it were all to be released, would constitute a risk to the safety of those working in or entering the area (i.e. the oxygen level would fall below 18%).
  For assistance, please see the University's oxygen depletion calculator at http://www.admin.cam.ac.uk/cam-only/offices/safety/publications/hsd053c/calculator.html
- Work involving large amounts of flammable liquids. In this context, 'large amounts' means litres or more of Flammable liquids, 2.5 litres or more of Highly Flammable liquids or 1 litre or more of an Extremely Flammable liquid.

The following substances are included because they have specific legal requirements in terms of licensing, storage, record-keeping and/or disposal.

- Toxins which appear on Schedule 5 of the Anti-Terrorism Crime and Security Act.
  http://www.nactso.gov.uk/Publications/HazardousMaterials.aspx
- Controlled Drugs covered by the UK Misuse of Drugs Act.
  http://www.homeoffice.gov.uk/publications/alcohol-drugs/drugs/drug-licences/controlled-dr

3. If work changes and indicates a need to use any of the above high risk substances, the Supervisor must advise the individual of the need to obtain permission prior to the start of such work.
4. Any such work must comply with the University "Hazardous Substances Policy", Sep 2011 or latest revision.

2.4 OUT OF HOURS WORKING

Technical and secretarial support staff operate on flexible hours and the normal working hours covered, are usually from 08.30 to 17.30 Monday to Friday. Any times outside these hours are classed as "Out - of - Hours Working "

Regulations governing the use of laboratory facilities outside normal working hours are as follows:

1. The work must be suitable for "Out - of - Hours Working", as confirmed in the risk assessment for the work.
2. "Out-of-Hours Working ", is only allowed on the understanding that there must be at least one other person within easy call in the event of a mishap. If this is not the case see lone working in point 2.5 below.
3. If, in exceptional circumstances, it is necessary to work after midnight, permission must be obtained from the supervisor.
4. All persons must use the Signing In/Out book when they enter/leave the building after 19.00 hours on Monday to Friday inclusive, and any time on Saturday, Sunday or Bank Holidays. Persons already in the building at the commencement of these periods must also sign in. This book is stored at the inner entrance on level 1. This would be used by the Fire Brigade, to search for people after a fire.

2.5 LONE WORKING

1. Lone working can be very high risk, as help is not readily available.
2. Lone working normally occurs out-of – hours, and therefore all the points in 2.4 must be adhered to.
3. Lone working must be risk-assessed and agreed with your supervisor on a case - by - case basis.

4. Consider the use of a telephone buddy system with a colleague or friend, if you have to lone work. This is a pre-arranged telephone call to a friend to say that you have left the building safely after finishing working. This must be set up correctly with clear instructions about what to do in the event of you not making contact. The University Security control centre can act as a "buddy" if you have no other alternatives.

2.6 UNATTENDED EXPERIMENTS

1. If experiments are to be left running unattended, they must have a card stating what equipment is in use, what to do in an emergency and a contact telephone number.
2. This is particularly important for chemical reactions.
3. This is also important for equipment left running overnight.
4. Pre-printed write on/wipe off, "Unattended Reaction Cards", are stored next to the relevant areas ready to be displayed.
5. Remember that out of hours, the person finding a problem may have no scientific training and chemical structure pictograms may be meaningless.

2.7 IMMUNOCOMPROMISED WORKERS

1. Risk assessments are written based on the assumption that workers are healthy individuals.
2. If your health changes, for example due to taking steroids or antibiotics, you may need to reassess the work that both you, and your colleagues near you, are doing.
3. Advice may be sought in confidence from Occupational Health, the Departmental Safety Officer or your Group Head.
4. It is particularly important that pregnant women, reassess the risks of all their work, as soon as they realise that they are pregnant.
5. Both males and females considering starting a family, should reassess the work of both themselves and others around them, to make sure that nobody is using anything that could be damaging to reproduction.

2.8 PREGNANT WORKERS

The Department has a wide range of hazards within it. When workers are pregnant they need to take particular care. Some substances e.g. radiation and certain chemicals, are more damaging to the foetus than to the adult. Some tasks become more hazardous when you are pregnant e.g. lifting heavy weights, or standing on ladders.
As soon as you realise that you are pregnant (which may be well before you wish to formally notify others) you must stop and reassess the work that you are doing, to check the hazards to you and to your baby. The Institute has a special risk assessment form held by the Site Departmental Safety Officer, the form details some of the risks to consider. In some circumstances, including those working with radioactivity, it is essential that you seek professional advice on the risks. Help is available in the Department from the DSO, your Group Head, or a specialist University Safety Officer. This is a very complex subject and your own GP is unlikely to have sufficient knowledge. Should you prefer to, you can consult in confidence either Occupational Health or the Safety Office for advice.

2.9 PERSONAL PROTECTIVE EQUIPMENT

The Department provides personal protective equipment for use when the risk assessment directs it. You must be very careful that you are using the right type of equipment to fully protect you from the hazard; many items such as disposable masks, look very similar but are completely different in the protection that they give. If in any doubt about safety equipment, then ask.

1. **Labcoats**
   - The Tennis Court Road Site, has a Policy on the wearing and laundering of labcoats.
   - Laboratory coats are compulsory when working in the laboratories and these must be removed before leaving work.
   - Coats must be hung on coat racks and must not be left on chairs when not in use.
   - For biological work of ACGM level 1 (Advisory Committee on Genetic Modification) or ACDP level 2 (Advisory Committee on Dangerous Pathogens), it is a requirement that Howie style laboratory coats are worn (elasticated cuffs, button-up neck, wrap-over front). This type of coat is suitable for all types of laboratory work in the Department.
   - Lab coats must not be worn in the canteen, toilets or office areas, including the administration offices around Reception.
   - To help distinguish certain areas of cleanliness/risk to work, some areas use different coloured lab coats.

2. **Safety Glasses**.
   - Each new lab worker, is issued with their own pair of general safety glasses. Spare pairs are available in wall-mounted holders around the Department.
   - It is possible to obtain prescription safety glasses if you require them.
   - Always wear safety glasses when handling chemicals where the risk assessment indicates a danger to the eyes. This includes pouring of concentrated disinfectants, detergents, and bleach

3. **Optical Radiation Glasses and Visors**. (Lasers and UV)

Personal Protective Equipment for optical radiation, must be selected depending on the wavelength of the radiation for which the protection is necessary. You must carefully check the correct specification, as all glasses look the same but offer very different protection, if in any doubt seek advice from the Laser Safety Officer.
The lasers have protective safety glasses nearby, to help protect operators against accidental exposure to some of the wavelengths emitted by the lasers. Each pair of glasses is specific to that laser and must not be interchanged. The specification of the glasses, depends on whether they are intended for accidental stray beam protection or for visualising the beam when aligning the lasers.
For most standard UV sources, (non laser), either UV safety glasses or a UV safety visor must be worn. If the risk assessment shows the potential for UV to cause skin damage (which is most common), then wear a UV visor, rather than UV safety glasses, as the visor protects against skin damage to your face, as well as to your eyes. All UV protective safety visors are marked on them as being suitable to protect against UV, if the visor is not marked as suitable for UV, you must assume it is not safe to use against UV.

4. **Cryogenic Visors**.

Safety visors are essential for protection when using cryogenic liquids, these look very similar to the UV visors but offer no protection against UV. Safety glasses are not sufficient protection when pouring liquid cryogens, as a splash in the eye can blind.

5. **Masks and breathing apparatus**

Masks and breathing apparatus are known as Respiratory Protective Equipment, or RPE. Selection of the appropriate type is complicated and particular care is needed. Basically if you think you need a mask for safety reasons, you must seek advice. RPE is stored by the technical team, who regularly check the condition of the equipment,

and who can offer advice on fitting and the correct type. Use of a mask may require face - fit testing by the Safety Office. The Department has one self-contained breathing apparatus set at the Pembroke Street site, which can only be used by fully trained staff for emergencies.

6. **Gloves**.
   - A very wide range of glove types are available and it is essential that the correct type to glove, is identified by risk assessment.
   - Latex gloves are prohibited in the Institute, to avoid the problems caused by latex allergies. Anyone who thinks that they require to use latex gloves, must demonstrate by risk assessment, that latex gloves are necessary and must undergo annual health monitoring.
   - Remember to check that contractors or Visitors do not have latex gloves.
   - In general the purple nitrile gloves, are suitable for most routine lab activities but these are usually not the most appropriate gloves when using chemicals.
   - Blue heavy-duty nitrile “Marigold” type gloves, are suitable for some but not all work with chemicals.
   - Check glove compatibility charts for the chemicals that you intend to use.
   - Heat protective gloves are available for use next to the autoclaves, microwaves etc. and cold protective gloves are available for use next to cryogenic vessels, -80 freezers etc.
   - Remember to wear gloves, when using strong cleaning and disinfecting materials.
   - Disposable gloves must be worn only once and must then be disposed of they must not be left lying around or attempt to dry them.
   - Do not contaminate items such as door handles, telephones and keyboards while wearing gloves. It is forbidden to exit laboratories wearing a pair of gloves. In the event of having to carry samples you must use the one-glove rule, where you carry the sample in the gloved hand and open doors with the ungloved hand. This may involve the use of a trolley if carrying multiple samples.

7. **Other**. Other protective equipment is also available for specific activities. The equipment includes aprons, steel capped shoes, shields etc.

2.10 AIR HANDLING EQUIPMENT

1. FUME CUPBOARDS

- Fume cupboards suck air in, away from the work.
- In Biotechnology fume cupboards are ducted directly out above the roof.
- Consider that you may be discharging contaminants near a roof area where contractors could be working.
- Make sure that the fume cupboard fan is running and that the airflow is showing in the green area of the scale before you start work.
- Do not use the fume cupboard if the alarm sounds.
- Keep the sash at a safe working height.
- Be particularly careful to keep the work area as unobstructed as possible. If you fill the fume cupboard too much, it restricts the airflow and increases the chance of contamination coming out. This is particularly true of large equipment such as waterbaths at the back of the fume cupboard. Consider raising larger objects on feet to allow air to circulate.
- Do not store flammable solvents in the fume cupboards, they must be stored in the special flammable solvent cabinets below.

- Handle only the minimum quantity of all chemicals when using them to carry out experiments, keep stocks safely stored out of the work area. This is particularly important with flammable solvents.
- Work over a spill tray, when you are doing tasks which could lead to a spillage, e.g. decanting wastes.
- Remember that the fume cupboard base is not sealed at the front, and any liquid spills not over a tray will pour onto your lap.
- Beware of incompatible chemicals mixing, especially in liquid waste collecting bottles.

2. LAMINAR FLOWS

- Laminar flow cabinets blow sterile air across the work and therefore usually straight onto you.
- Do not use for hazardous work.
- Consider that even sterile media, may contain ingredients such as antibiotics, to which you can become sensitised.

3. SAFETY CABINETS

- All safety cabinets in the Institute are recirculating. This means that the air is passed through HEPA (High Efficiency Particulate Air) filters and is then returned to the cabinet.
- Although a HEPA filter removes organisms, it does not remove all chemicals, which are free to blow over you, your work and into the rest of the room.
- If safety cabinets have been used for biohazardous work, they must be decontaminated before and after each use and before work is done by engineers.
- If the engineer needs to gain access to the filters, it is not sufficient just to decontaminate the cabinet surfaces, the safety cabinet has to be fumigated.
- Take particular care when fumigating a recirculating safety cabinet, as the fumigant gas has to be generated and removed in situ. Fumigant gases are toxic and must not be discharged into the room.
- Formaldehyde, the gas previously used for fumigation, is now classed as a known carcinogen and it is also flammable. A better alternative is hydrogen peroxide.
- Do not attempt fumigation without a written risk assessment and clearance from the DSO.

2.11 <u>WASTE DISPOSAL</u>

- The Department tries to recycle goods, whenever it is safe to do so.
- Correct disposal of wastes generated during experiments, is critical for the safety of all members of the Department. Wastes must be labelled and stored safely at all stages of disposal.
- It is particularly important to safeguard the technical team, cleaning staff and external contractors, who have to handle the waste prior to disposal.
- Disposal of wastes must be considered at the risk assessment stage, to avoid problems at the end of an experiment with wastes being generated with no disposal method.
- Remember that you are the only person who knows what is present in the waste from an experiment. If you don't know what is present you shouldn't be handling it. Sort waste into types prior to disposal.
- Dispose of wastes in accordance with the University guidance and following the Institute's policy.

- Do not use sink disposal, unless you are certain that the waste is allowed to go down the sink. The Environment Agency restricts what can go down the sink and the effluent is monitored to check compliance.
- Non - routine chemical waste can be disposed of through the University Waste Disposal Service. It must be submitted to the technical team for disposal with a completed "Non - Routine Chemical Waste Disposal Form".
- Clinical waste is a strictly legislated waste stream and advice must be sought if you think that you will be generating clinical waste.
- Never mix incompatible chemicals.
- Seek advice, if you have a mixed waste which you are not sure about.
- As you leave the Department, you are responsible for clearing away and making safe all the items that you have ordered in or made. This is a non - transferable responsibility, so be careful who you hand them to.

2.12 MANUAL HANDLING

- It is important that you handle large or heavy items correctly, to avoid the risk of injury.
- Use the manual handling equipment provided. This includes sack barrows, trolleys, pallet trucks etc.
- Ask for assistance when handling large items.
- You must risk assess tasks, where you know that you will repeatedly have to handle large or heavy items.
- See if you can minimise risks e.g. by ordering goods in smaller amounts.
- Order new equipment through the technical team, who will consider delivery implications of large items of equipment.

2.13 USE OF COMPUTERS

- Most people now use computers throughout the day.
- Set up your workstation to avoid problems with repetitive strain injury etc. This is just as important for laptops as for fixed installations.
- Leaflets and advice are available on how to do this.
- Risk assess your own computer workstation set up at the start.
- You are most at risk as deadlines approach, when you have prolonged usage with high stress levels, so stick to plenty of short breaks and moving about. This also helps to avoid problems such as deep vein thrombosis.
- Plan your work to mix tasks and do not type for long hours.
- If you are spending hours on a computer at work, then minimise your recreational use of a computer or similar devices.

2.14 DRIVING AT WORK

- It is unusual for the Department to require you to drive at work.
- If you are using your own vehicle it must be insured for work use.
- If you need to take out a University pool vehicle, you must comply with the requirements, which will include showing your driving licence and you checking the vehicle before you take it.

2.15 SHARED AREAS

Areas of University buildings are often shared with other users. The Management Team of the Department operate a "Good Neighbours Policy" attempting to liaise and co-operate closely with other users of the sites and buildings.

Within the Department it is particularly important for safety that persons working in shared areas, do so in a responsible manner and leave the work area clean and tidy.

2.16 SAFETY INSPECTIONS

To check that the safety procedures and policies are being adhered to, the Department will carry out safety inspections. These safety inspections will be co-ordinated by the Departmental Safety Officer or member of the Technical team. The inspections will ensure that all areas of the Department are checked once a year. The inspection team will be selected from a panel of volunteers from all the Department staff and the team will inspect against a set list of questions. The results of these inspections will be reported to the Group Heads and Safety Representatives of the areas inspected and will be discussed by the Departmental Safety Committee.

SECTION 3 SPECIFIC AREAS OF SAFETY

3.1 GENERAL LABORATORY SAFETY

Comply with the 20 general safety rules. These rules are:

1. Read the safety information available and sign if necessary.
2. Make sure that you have been trained.
3. Ask for help if you are uncertain.
4. Plan and risk assess your work.
5. No eating or drinking in labs.
6. No food or drink must be taken into the labs.
7. Smoking is prohibited in and around the whole building, including the Undercroft area.
8. External coats and bags should not be taken into labs.
9. Wear the correct type of lab coat in the lab.
10. Take your coat off, as you go out of the labs.
11. Wash your hands as you go out of the labs.
12. You are advised not to wear contact lenses where a chemical or microbiological hazard exists.
13. Carefully consider safety, before you order chemicals and equipment.
14. Clearly label all chemicals, tubes, plates, etc with what they are, your name and any hazards.
15. Wear protective equipment when the risk assessment identifies a need.
16. Deal with all spills immediately.
17. Separate waste by type and if no bin is provided, then label all waste clearly and store securely, until the waste can be dealt with.
18. Store chemicals safely, keeping incompatible ones separate from each other.
19. If equipment fails to work, consult the operating manual for that equipment first. Perform the simple checks yourself and if still unable to make it work, take the equipment out of use and alert a member of the technical staff.
20. Keep your work area clean and tidy.

3.2 RULES FOR USE OF THE SYNTHESIS LAB

1. All users must have undergone separate safety training.
2. Only after successful completion of the synthesis lab training, can users be added to the list of registered users.
3. Only registered users of the Synthesis lab can work in the room unsupervised.
4. All people using the room, must log in and out using the signing-in book. This signing in can be once a day for multiple uses on the same day.
5. All work carried out must have an up-to-date Risk Assessment which includes action to be taken in event of a spillage.

6. All Risk Assessments for work in the Synthesis Lab must specifically consider if the procedure is safe for lone working and out of hours working. If so, it must include a statement of how safety requirements will be met, such as a telephone buddy system.
7. All work must be labelled with the User's name, date and the User's lab room number.
8. Any reactions left running must have a Reaction Card displayed, with all the contact details e.g. a mobile telephone number and safety information upon it.
9. Safety glasses and labcoats are compulsory and are the minimum, Personal Protective Equipment (PPE) required at all times in this laboratory, often additional PPE will be required.
10. Synthesis lab users must wear closed shoes and tie back long hair.
11. Gloves of a suitable type should be worn in the Synthesis lab. This depends on the work being done.
12. All bulk bottles of flammable solvents must be stored in the flammable solvent storage cupboards with the door kept shut. The volume of in-use solvents must be kept to a minimum.
13. All waste bottles must be clearly labelled and be stored in spill trays, with the lids loose.
14. All waste bottles must only be filled to the shoulder level, before being sent for disposal.
15. Each research group using the Synthesis lab, will have a Synthesis lab liaison person from the group.
16. Fume cupboards will be allocated, so that each cupboard has one main user.
17. Any long-term storage should, as a rule, be in sample vials or bottles, clearly labelled with the contents. Round bottomed flasks should not be used but where storage in round-bottomed flasks is unavoidable, these must be clearly labelled.
18. All abandoned or unlabelled experiments will be investigated and will be removed if not identified.
19. A list must be kept by labstaff of any broken glassware, and the level 3 technician will check and reorder or repair the glassware.
20. Each synthesis lab user, will be responsible for cleaning of their own glassware. Acetone rinses must be collected as chemical waste. Synthesis lab glassware must not be submitted as part of the routine glasswashing.

3.3 **ORDERING GOODS**

1. Think before you order something.
   - Is it allowed?
   - If it is dangerous, and if so can I order a less hazardous substitute?
   - Is it what I really want?
   - Does somebody else already have some that I could use?
   - Does it require notification/ special permission that I am ordering it?
   - Is it big or heavy with manual handling problems or special delivery instructions?
   - Where do I need to put it/store it? Especially chemicals and equipment.

- How will I dispose of it when I no longer want it?
- Is this the minimum amount that I need?
- Have I done my risk assessment for using it?
- Do I need to fill in a Health Record Form?
- Is it legal for me to order this, and if so should I have a licence?

2. When it arrives check.
   - Is the packaging damaged?
   - Is it really what I ordered in, and in the quantity that I requested?
   - Does it require special storage?
   - Does it require to be locked away immediately upon arrival?
   - Does it need to go on a safety list e.g. Highly toxics?
   - Does it need to be safety checked before use? e.g. PAT tested?
   - All equipment must be assigned an asset number and go on the asset register?

3.4 **USE OF CHEMICALS**

1. Consult the list of work with special requirements given in section 2.3 to see if it counts as high - risk work.
2. Notify the DSO if appropriate and obtain any special permission required before you start. High risk work may have to be approved by the Departmental Chemical Safety Advisory group. Health Forms may need to be kept, if certain chemicals are used.
3. Risk assess the work.
4. Comply with the University advice for handling chemicals “Safe Chemical Practice” Sep 2011 or latest revision.
5. Comply with the University and Departmental codes for disposal of wastes. An overview disposal chart exists which can help you.
6. Be sure that you are aware of any hazardous properties of the materials that you handle and take appropriate precautions.
7. Avoid direct contact with any chemical, avoid breathing in dusts or the vapour of solvents.
8. Beware of increased vapour concentrations where solvents or other toxic materials come into contact with hot liquids, as in washing up.
9. The action in the event of a spillage will have been considered at the risk assessment stage.
10. Deal with spillages immediately.
11. In the event of a large or unknown spillage, the Technical Team hold a chemical spillage kit. Spillage kits are also located in lab 318 and in the Central Delivery Building.
12. Each lab has a sheet detailing what to do in an emergency called the “Laboratory Incident Notice”. This can usually be found on, or near, the exit door.
13. It is essential that all containers of chemicals are clearly labelled with the appropriate hazard warning, e.g., flammable, explosive, oxidising, poison, corrosive, etc.
14. Keep warning signs on bottles as you decant and dilute the chemical, until the risk is no longer present.
15. If necessary, protect labels with transparent sticky-backed plastic and immediately replace any that are damaged.
16. Consult the safety information if handling peroxide containing chemicals.
17. Do not carry bottles by the neck.
18. All Winchester bottles must be carried in covered Winchester carriers.

19. Never overfill a bottle (only to the just below the shoulder level at most). This is particularly important in hot weather.
20. Work over spill trays, when a particular risk of a hazardous spillage exists.
21. The Department uses mercury and mercury-containing compounds. Mercury has special handling requirements both for safety and for environmental protection reasons. When using mercury, you must seek advice over safety precautions and work over a spill tray, to prevent any accidental spillages of mercury entering the drains. No mercury thermometers must be used, unless there is no other alternative and if you have to use mercury any potential spillage must be contained.
22. It is not recommended that contact lenses be worn whilst working in laboratories. Any liquid which enters the eye, can get trapped behind the contact lens and irrigation is almost impossible without removing the contact lens. Wearers of contact lenses must take precautions to prevent material entering the eye. Under normal circumstances, contact lenses must never be inserted or removed in the laboratory.

3.5 **FLAMMABLE SOLVENTS**

1. If you wish to use large quantities of a flammable solvent, see the technical team and request that it is kept as a stock item in the flammable store.
2. All stocks of solvents are stored externally to the building, in the central delivery building in a purpose designed flammable store.
3. The technical team will restock working stock bottles of solvent daily.
4. Only keep the minimum quantity of solvent required for that day's use, in the flammable solvent cupboard.
5. Take out only the minimum quantity required and return the remainder to the flammable cupboard immediately. Make sure you shut the door of the flammable cupboard.
6. Do not leave bottles containing more than 500ml of flammable solvents on floors or bench tops.
7. Empty solvent bottles should be placed in a fume cupboard with the lid off, to allow the solvent residue to evaporate. Then the bottle must be rinsed, the lid put back on and the bottle put out for recycling.
8. Do not store volatile solvents, or materials stored in a volatile solvent, in any refrigerator, unless you know that the refrigerator is spark-proof.
9. Beware of Bunsen burners when using flammable solvents.

3.6 **BIOLOGICAL**

Each type of organism is assigned a containment level, based on its normal risk to humans and the environment. The Institute of Biotechnology routinely handles organisms at containment level 1 ACDP (Advisory Committee on Dangerous Pathogens). Some areas work at ACDP containment level 2. One area uses a specially weakened strain of an organism which would otherwise be classified as ACDP and SAPO containment level 3 but is derogated down to containment level 2. The Department has a Biological Safety Officer and deputies, who can offer advice to staff who are planning work which may have biological hazards. A risk assessment must be completed prior to commencement of the work and this must be approved by either the Biological Safety Officer or the Biological Safety Committee, depending on the expected containment level. For lower risk procedures with ACDP class 1 organisms, the Biological Safety Officer can approve them and notify the Biological Safety Committee. For higher risk procedures, with either

genetically modified organisms or organisms of ACDP 2 or above, the Biological Safety Committee must approve each risk assessment.

1. The term biological hazard, covers a variety of activities and agents, which present a hazard to health in the working environment.
2. When considering Biohazardous work, remember it is not just organisms that may be harmful but human samples, plants and allergens as well.
3. Their harmful effect may be immediate or may be delayed for years.
4. The handling of tissues and fluids of animal origin, particularly human and monkey tissues, always carries a risk of infection. It is recommended that the handling of all human and animal tissues, be carried out as though they contain pathogens.
5. Consider requirements for compliance with ethical and safety issues when obtaining human samples. This includes complying with The Human Tissue Act, The Human Fertilisation Act, and the requirement, to ascertain that samples are obtained from polio free Countries. If in doubt about any of these, seek advice from the Biological Safety Officer or Departmental Safety Officer.
6. Samples such as river water, stagnant water, soil and other environmental samples, must be treated as if they contained pathogens.
7. It is wise to keep up to date with standard immunisations such as tetanus and this is particularly important if handling soil. Certain workers handling blood or other human samples, may need to be immunised against Hepatitis B. Occupational Health can advise you.
8. When handling biological agents, all the routine laboratory precautions must be followed, plus the additional precautions listed:

    a) Eating, drinking, licking labels, biting nails or pens is not allowed in the lab. Application of cosmetics is not allowed in the laboratories, the only exception being a handcream, which is kept exclusively for lab use.

    b) It is recommended that contact lenses are not worn in laboratories. Only in an emergency must lenses be removed in the laboratory.

    c) All wounds and lesions must be covered with waterproof dressings.

    d) Be aware that fume cupboards and safety cabinets have different air handling characteristics. Where an infection risk exists, the work must be carried out in a class I or class II safety cabinet. Laminar flow cabinets must only be used for non-infectious, non-hazardous work such as pouring agar plates.

    e) Avoid spillages and deal with any spills immediately. The spillage procedures are displayed in each laboratory.

    f) Work to keep organisms contained and to avoid creation of aerosols.

    g) Protective clothing must be removed and hands washed thoroughly, before leaving the laboratory.

    h) Broken glass and sharps must be disposed of correctly, in order to prevent injury to cleaning staff. All needles, scalpel blades and other small sharps, must be disposed into “sharps bins” for incineration as clinical waste. All syringe bodies (even those without needles) must also be placed in the sharps bins. Sharps containers are checked regularly by the technical team and when full, containers are collected by the technical staff for disposal as clinical waste.

i) Disposal of contaminated materials. All biohazardous waste must be disposed of safely. In the Institute, this is normally done by autoclaving. A suitable disinfection procedure must be used if the item cannot be autoclaved.

j) Waste must be stored and transported safely prior to autoclaving.

3.7 GENETIC MODIFICATION

Projects involving genetic modification work are assigned a classification based on the normal risk to humans and to the environment. The Institute routinely handles organisms at containment level 1 SACGM (Scientific Advisory Committee on Genetically Modified Organisms). The Department has a Biological Safety Officer who can offer advice to staff planning work, which may involve genetic modification. A risk assessment must be completed and approved, prior to commencement of the work. All projects involving genetic modification must be approved by the Biological Safety Committee of the Department. All the precautions listed in the section on biological safety above, must be followed. Staff must be aware that genetic modification of even plants can cause an increased risk to health e.g. by increasing allergenicity. Work with genetically modified organisms is carefully controlled. All experiments involving carrying out Genetic Modification work or working with viable genetically modified organisms must be approved by the biological Safety Committee. A register is kept of all persons in the Department working with genetically modified organisms.

3.8 RADIOACTIVITY

1. The Department is currently not set up to carry out any work on the premises with open unsealed radioactive sources.
2. When working with radioactivity, the University regulations must be complied with. These regulations are explained in University Safety Manuals, Radiation Books 3 and 4 " Working Safely With Unsealed Radioactive Sources In the University of Cambridge" and "Working Safely With Sealed Radioactive Sources and Radiation Generators".
3. Any person considering work involving radioactive materials must first consult one of the Radiation Protection Supervisors for the Department.
4. Radioactive workers must be fully trained prior to commencing work.
5. Acquisition and disposal limits for radioactivity are set by the University in consultation with the Environment Agency. Failure to comply with these limits can lead to prosecution.
6. All radioactive sources, even radioactive samples brought in from another Department, must be recorded in the "Radioactive Substances Register" and allocated a unique Departmental Number to aid tracking.
7. A radioactive badge must be worn when carrying out radioactive work.
8. Accurate records must be kept of all usage and disposal of radioactive substances.

3.9 ARTIFICIAL OPTICAL RADIATION

Artificial optical radiation includes all non natural sources of UV light, visible light, infra-red light and lasers. Wavelengths vary but all wavelengths between 180 nm and 1mm can potentially damage eyes and skin. The most harmful are normally those with shorter wavelengths including those of UVB and UVC, with the area around 270nm being the worst.

All artificial UV light sources present in the Department, including those on short-term loan, must be registered with the Laser Safety Officer. A written risk assessment for each artificial UV light source will also be needed. Visible or Infrared light sources, other than trivial sources, must also be risk-assessed. Normal fluorescent lights, photocopiers, projectors etc can be considered to be trivial under normal use. Please speak to either the

Laser Safety Officer or the Departmental Safety Officer for further information and they can help you perform an Exposure Limit Value calculation if any doubt exists.

3.9.1 GENERAL UV SAFETY

A number of sources of UV light are used within the Institute of Biotechnology. Some of the more common sources of UV are described in the sections below. Ultra Violet (UV) Radiation has its own hazards and can damage eyes and skin. Follow the advice given in the general UV University Policy "Working Safely With Artificial Sources of Ultraviolet Radiation" Oct 2012, or latest revision. The University also offers advice to Biological Workers Using UV in "UV in Biological Applications" Oct 2012 or latest revision.
Remember that Transilluminators (and polymerising / crosslinking lamps) are extremely powerful sources of UV light. Using this type of equipment without proper UV protection, can potentially push you over the safe daily exposure for UV in a matter of 10 - 30 seconds. Exposure to powerful UV sources can result in burns to the skin, and can cause an eye condition called photokeratitis which is very painful and can even cause temporary blindness. It can also increase the risk of contracting skin cancer later in life.
In general:

- You must wear a UV protective safety shield when dealing with exposed sources of UV. This is particularly important if the manufacturer lists the UV light as EN 62471 Risk Group 3.
- Make sure that eyes and all the skin are covered when using any open UV source. Pay particular attention to the wrist area at the join between gloves and labcoat and at the neck area.
- A powerful source of UV light may be invisible to the naked eye, or emit only a dim light. This is because the cells in the eye which are responsible for vision, have a limited response to UV. Brightness is therefore no indication of power.
- It is best to enclose the UV as much as possible to avoid problems.
- Take care not to expose others – ensure your work area is adequately screened.
- Avoid reflections off surfaces (specular reflections), particularly off white benches and shelves.
- People's sensitivity to UV can be increased by certain conditions e.g. pregnancy.
- Beware of toxic chemicals which can be produced when exposing some materials e.g. PVC to UV.

3.9.2 SOURCES OF UV AND SPECIFIC SAFETY MEASURES

3.9.2.1 Gel Cutting/Molecular Biology Transilluminators

- These lamps are usually flat light boxes, on which gels are placed for visualisation and for cutting.
- Some are contained within boxes to ensure that light can only get out in one direction.
- Exposure can be quite prolonged, and it is tempting to lean over the box and stare at the gel for a long time. Indeed when bands must be excised the work can be very involved and time consuming.
- As a consequence you must use a **UV face shield** at all times.
- Most such UV sources have a built in cover that protects from UV. While this is a handy tool to keep you safe, be aware that when you lift it to put the gel in or take it out (or are working underneath it to cut out a band), you're exposed to the light, and you must take other precautions to remain safe.
- It is also important to protect your colleagues from these UV sources. Try to place UV equipment, away from main thoroughfares and areas of traffic through the lab.

- If you have to use such items in shared spaces, ensure that others are not directly exposed to UV. Ensure that your colleagues know that you are handling an essentially open UV light source and remind them to keep out of the light.

3.9.2.2 Polymerising/Crosslinking Lamps

- Several UV lights are used for photochemical reactions to crosslink or polymerise a material. Usually such lamps are intensely bright and broad spectrum, with a wide range of wavelengths. This means that the potential to cause harm is huge.
- Always use such lamps in such a way as to avoid exposure.
- Many are interlocked, such that the door being open, prevents the light turning on; **it is never appropriate** to use such lights without the interlock.
- Others have black plastic boxes with them that can be used to contain the light. Use of these lamps without such containment is very hazardous, and must not be done**. Always use the containment apparatus.**
- If there is no personal exposure to UV, specific personal protective equipment (PPE) should not be needed. However if you feel unsure or wish to use PPE as a backup safety measure, then contact your supervisor, The Laser Safety Officer or the Site Departmental Safety Officer.

3.9.2.3 UV 'Wand' Lamps

- There are several UV wands in the Institute; these are small UV lights emitting 254nm-365nm, usually less than 12W spreading over a wide area.
- These lights are useful for visualising chromatography plates, determining the extent of chemical spills, etc.
- While the intensity at any one point in front of the light may be insufficient to cause immediate harm, it is still appropriate to take some precautions when using such a light.
- Always point the light away from you and away from colleagues, hold it at arms length, and never use it for more than a few seconds at a time.
- Remember, while short exposure may not produce immediate symptoms, prolonged exposure could still cause serious harm.
- If you must use such lights for more than a few seconds, it is appropriate to wear a protective face shield and gloves, in addition to normal PPE (lab coat).

3.9.2.4 Microscopes

- Some microscopes, use UV light in fluorescence applications.
- The manufacturer has considered what users will normally do and these instruments are usually safe for routine operations.
- Make sure that the equipment is serviced regularly.
- Do not exceed run times for lamps as they contain mercury and could break and release the vapour.
- The equipment may need more precautions when the UV light source is being accessed or replaced. This is often during repair or servicing.

3.9.2.5 Sterilising Lamps

- UV is used in sterilising/disinfecting lamps which can be found in safety cabinets and water systems. They may also be used as ceiling lamps in clean rooms.
- Most water systems have the UV lamps totally enclosed during normal use and therefore are safe until opening the casing, or carrying out servicing.
- Safety cabinet lamps are used to irradiate a discrete enclosed cabinet area and are safe as long as the area is not accessed with the lamp on.
- Ceiling lamps are the least controlled, as they irradiate a large area and are on an automatic time switch to come on at night. For safety reasons, UV lamps in the ceiling are interlocked with the normal light switch so that turning on the normal light inactivates the UV light. All such lights in the Institute are no longer in use.

- If for any reason the time clock has failed and the UV light comes on during daylight, do not enter an area irradiated by UV lamps.

3.9.2.6 Spectrophotometers

- Most of the spectrophotometers are UV/ Vis ones, meaning that they contain a UV lamp as well as a visible range lamp.
- Again the UV lamp is normally covered during operation of the Spectrophotometer and the UV lamp should be interlocked so that the lamp cuts out if the cover is opened

3.10 **LASERS**

1. The Department uses lasers of various classes, including the highly powered, class 3B and 4 lasers.
2. All laser users, are required to read and comply with the directions given in the University Safety Manual Radiation Book 1,"Safe Use of Lasers" Sep 2012, or latest revision.
3. Anyone considering use of class 3 or 4 lasers, must discuss the implications with the Laser Safety Officer and they must read and comply with the Department's local laser safety rules, specific for the laser that they are using.
4. All laser users must undergo safety training and be registered as Laser Users.
5. Anyone considering purchasing or acquiring a new laser, or equipment containing a laser, must consult the Institute Laser Safety Officer (LSO) for advice. This is essential where the laser beam can be viewed during usage.
6. Each new laser must be notified to, and be recorded by, the Laser Safety Officer.
7. Each laser must have an individual risk assessment written that records the risks of the way it will be used.
8. Laser risk assessments are specialist documents, with a different format from the general risk assessment form.
9. The risk assessment must be reviewed and reassessed regularly and definitely each time that the equipment is modified, moved or the procedures change.
10. Failure to comply with either the University rules or the Department Local Rules will mean that the person is prevented from using the lasers.
11. Users will undergo a training programme that is documented and recorded. Only then do they become an authorised laser user.
12. The LSO keeps a list of all authorised laser users.
13. The LSO must be informed of significant changes to any laser equipment or its use, including any change in location or owner, or modifications which would require changes to the risk assessment or Local Rules
14. Anybody carrying out maintenance or modifying a laser system must first contact the LSO to obtain permission.
15. All repairs and modifications of any equipment where a laser beam could be exposed during maintenance or repair must be notified to the LSO. The LSO will liaise with the technical team to ensure that safety procedures are followed.
16. All laser pointers must be of class 2 or lower, be CE marked and be deemed safe for usage. If in doubt contact the LSO.
17. No laser pointer should be aimed at a person irrespective of the power of the laser.
18. In case of an accident involving a laser, where an exposure or possible exposure to the laser has occurred, contact a first aider who will inform the LSO of the accident as soon as possible. In all cases the person must attend Hospital with the first aider, who should inform the emergency services of the involvement of the laser and the type of laser that was involved. In order to do this, the first aider takes the laser safety grab card with them to the Hospital. This card is situated on the outside of the room door containing the laser. This card has details on it, of the

wavelengths involved, and hence the parts of the eye that could have been damaged.

3.11 **ELECTRICAL**

1. The Department has over one-thousand-five-hundred pieces of electrical equipment.
2. Equipment can be dangerous if misused, it can give an electric shock or catch fire.
3. Comply with the University Guidance “Electricity - Guidance for Working Safely with Electricity in the Unversity of Cambridge” Dec 2012, or latest revision.
4. When ordering new laboratory equipment, make sure that it is CE marked.
5. Inform the technical team of the intended purchase of equipment, as they can help you, particularly with complicated equipment with special power requirements.
6. Avoid acquiring old equipment that does not comply with current safety legislation.
7. Electrical equipment must not be plugged into the mains using a 2 pin plug. If items such as laptops are supplied with a 2 pin plug, the plug must be replaced with a 3 pin plug. Use of 2 pin plugs even with adaptors, has been the cause of several fires.
8. Each portable piece of electrical equipment is checked annually for electrical safety, using the Portable Appliance Test or PAT test as it is commonly known.
9. When PAT tested, only equipment passing the PAT test will be left for use. Failures will be withdrawn from use.
10. Each piece of equipment has an asset number on it, which is used to trace the equipment and a sticker showing that it has been PAT tested with the retest date. This is usually on the front right hand corner of the equipment.
11. Check that each piece of equipment is within the retest date, this is particularly important if you move equipment or take it from a cupboard.
12. Make sure that all new electrical equipment is checked by the Technical Team, prior to its use.
13. Be aware that high voltage supplies over 10 KV can be a hazard to someone who is close by, but not actually touching the apparatus.
14. Heat producing electrical equipment such as ovens, heat guns, soldering irons, desk lamps etc., should all be switched off when not in use. They can ignite paper etc. left nearby.
15. Master switches associated with particularly large or experimental equipment, must be clearly marked, to enable them to be turned off quickly in an emergency. Switches should be easily visible and left unobstructed.
16. It is good practice to label all plugs with the equipment they feed, as this helps if you need to disconnect in an emergency and also prevents accidental disconnection especially of fridges.
17. Do not handle electrical equipment with wet hands and do not work in close proximity to water supplies or other unearthed metalwork where there may be a chance of touching 'live' parts of the equipment
18. Switch off electrical equipment when making alterations or modifying circuits.
19. Remember that high-tension batteries have an innocent appearance, but are capable of inflicting lethal electric shocks.
20. In some laboratories where experimental electrical equipment is built and used, it may be desirable for technical reasons to omit earth connections. In such cases it is essential that all users are made aware of the fact, by notices attached to the equipment. In those cases where there are specific dangers, such as high voltage, warning notices must be displayed.
21. The supply services to laboratories must not be interfered with or altered in any way by unauthorised persons. The responsibility for these supplies lies with the Maintenance Section.

22. When letting electrical leads trail, beware of trip hazards. Rubber over - strips should be used, or else the cables should be taken overhead on a gantry.
23. Beware of moving parts e.g. shakers, cutting through electrical leads.
24. In the event of a person suffering an electric shock:
    - Switch off the supply if possible, and move the victim out of contact with the 'live' equipment, taking care to use an insulating object or material so that you do not risk the same shock yourself e.g. a wooden broom handle.
    - If the victim is unconscious, call a first aider to begin artificial respiration. Then call the emergency services.
    - Electrical burns, even minor shocks which may leave only superficial signs of damage, are often deep seated in the tissue below the skin and should never be neglected.

3.12 **CRYOGENICS**

Cryogenic (very cold) liquids and solids are used in the Department. They present several different hazards, which must be considered. The cryogens normally used in the Department include liquid nitrogen, and solid carbon dioxide or dry ice.

Asphyxiation hazard

- Cryogens will evaporate at room temperature and can cause the oxygen in the air to be displaced. If the oxygen concentration gets below 18% it is dangerous.
- The gases have a very high expansion coefficient and a little can expand massively.
- Do not store or handle any cryogenic material in a small room or enclosed space.
- Never transport these materials in the lift at the same time as people, use the override switch on the goods lift to send it to the desired floor.
- In the event of a major spillage, immediate evacuation of the area is essential. Remember that when the concentration of oxygen falls below 6%, even one breath can be fatal.
- In a severely oxygen depleted atmosphere, any attempts to rescue a collapsed person would be fatal. Only the emergency services wearing full breathing apparatus would be able to enter.
- To minimise the chance of oxygen depletion, wherever possible cryogens are stored in rooms which are well ventilated by fume cupboards. This means that if a cryogen spills during a power failure, these rooms could also become oxygen depleted.
- Make sure that oxygen depletion monitors are present, in unventilated areas where oxygen depletion is possible. Monitors may be fixed to the wall or may be portable. These monitors sound an alarm and show a red flashing light if the oxygen drops below normal levels. In the event of an oxygen depletion alarm sounding, you must leave the area immediately.
- Some areas where dry ice is handled, could become carbon dioxide enriched, before the oxygen depletion monitors sound. These areas have fixed carbon dioxide monitors. If a carbon dioxide monitor sounds you must vacate the area immediately.
- Areas where cells are grown in carbon dioxide enriched incubators, also have fixed carbon dioxide monitors.
- Staff e.g. cleaners, or security personnel, entering lab areas out-of-hours should wear a portable oxygen depletion monitor. The technical team keep a spare monitor for use in emergencies. These portable oxygen depletion monitors would not respond to toxic levels due to increased carbon dioxide until the oxygen is also lowered.

Cold

- Cryogenic materials are extremely cold, therefore touching them with bare hands can lead to cold burns, prolonged contact to frostbite and in serious situations even hypothermia.
- Always wear cold protective gloves, which can be removed quickly in the event of a spillage.
- A full-face visor must be worn when pouring liquid gases. A splash of liquid nitrogen into the eye can blind.

Oxygen enrichment

- Very cold liquids such as liquid helium can cause oxygen from the air to liquefy. Liquid oxygen is very reactive and can cause materials to be combustible in air that would not normally burn.
- Oil and grease are particularly hazardous in the presence of oxygen, as they can ignite spontaneously and burn with explosive violence.
- An oxygen-fed fire may not be able to be extinguished using conventional extinguishers.
- Liquid oxygen explodes when added to various organic compounds.
- Dry ice/acetone mixtures are very dangerous and should be avoided.

Alteration of materials

- Many materials can become very brittle at low temperatures.
- Be particularly careful about electrical cables.
- Materials used for cryogenics, must be specially designed for cryogenic use, to avoid structural failure.

3.13 LAB GASES

The Department has a range of laboratory gases. Some like natural gas and CO2 are piped round the building. Others are provided in pressurised gas cylinders. When using gas cylinders you must comply with the following:

- Read the University policy “Compressed Gas User Guidance” Sep 2011 or latest revision`.
- Cylinders need special handling and you should not consider handling one unless you have been trained.
- Cylinders are kept in the central delivery building until required, where a minimum holding of the commonly used gases are stored in a special gas store.
- Consult a member of the technical team if you are considering ordering a gas that is not routinely stocked, as special safety precautions may apply and new equipment may have to be ordered.
- Notify a member of the technical team in plenty of time when you require a new cylinder from stock.
- The technician will attach a 3 part label, to the cylinder, (full/in use/empty) which is cut away as appropriate, to indicate the current status of the cylinder.
- Gas cylinders must always be used with the correct gas regulators and adaptors.
- The regulator must be in date and carry a valid inspection tag.
- Each cylinder must have a key to turn off the gas, either attached to it or stored visibly nearby.
- Lubricants or PTFE tape must not be used on gas regulators. This is especially dangerous on oxygen cylinders.

- The main cylinder valve should be closed when the cylinder is not in use,
- The valve must be closed when the cylinder is finally empty.
- Never connect a gas cylinder or compressed air directly to glass apparatus, always use a safety bottle (trap or "plus and minus" bottle).
- Never attach sharp objects such as syringe needles and glass pipettes to pressurised lines, as they can act as darts.
- While in the laboratory, cylinders must be securely held, preferably in a cylinder stand. If this is not possible you may use bench clamps.
- Special trolleys must be used to transport gas cylinders. Cylinders are very unstable and must be handled by trained operators wearing footwear that offers suitable foot protection, such as steel capped boots.
- Manufacturer's check gas cylinders for safety each time they are returned so do not keep a cylinder for more than 5 years.

3.14 ULTRASONICS

- Sound at ultrasonic frequencies can damage hearing.
- When purchasing ultrasonic equipment, purchase shielded or quiet machines.
- Make sure that ultrasonic equipment is sited in infrequently used areas.
- Fix items such as probes securely, to minimise the sound.
- Wear ear protectors if staying in the room with the ultrasonic equipment.
- Make sure that others around you are not exposed.

SECTION 4 EMERGENCY PROCEDURES

4.1. GENERAL EMERGENCY PROCEDURES

4.1.1 The exact response to an emergency varies depending on the type of emergency but the basic rules are the same:

- Don't panic.
- Make sure that you are safe.
- Alert others.
- Try to help others and prevent any further problems.
- Get away from any dangerous area.

4.1.2 The contact details for an emergency are listed at the front of the manual.

4.1.3 During normal working hours you can contact a member of the technical team or office staff for help and advice.

4.1.4 Out of working hours you can contact the University Security control centre, which is operational 24 hours a day 7 days a week.

4.2 ACCIDENTS

- All accidents/incidents involving injury or potentially dangerous situations must be recorded.
- This enables both the Department and the University to monitor trends and to try to prevent repeat accidents of a similar nature occurring.
- Accidents are recorded on both a University Accident/Incident form and in the Site Accident book.
- The Department Departmental Safety Officer (DSO) signs the accident form and forwards a copy to the Safety Office within 3 days.
- The original records are filed securely by the DSO.
- The Safety Office may have to report the accident to the HSE, depending on the severity of the incident.
- If the accident is particularly serious or involves a member of the public (this includes all students and PhD students) the DSO reports the accident to the Safety Office by telephone, prior to sending in the accident form.
- All accidents and other hazardous incidents are investigated by the Site DSO and a report is made to the Departmental Safety Committee.

4.3 FIRST AID

- A first aider must be called where a person has been injured.
- The first aiders for the Department, are listed on green signs around the Department. A list can be found as Appendix A at the back of this Safety Manual and in the front Emergency section.
- The University telephone book lists first aiders by site location. The list can be found at the back of the book
- In the event of a serious injury, summon an ambulance by dialling 1999 giving details of the injuries and the exact location of the building. Then alert security on 101 who can help in an emergency.
- If the first aider decides that medical attention is necessary but not requiring an ambulance, the casualty will be sent by taxi to Addenbrooke's Hospital Accident and Emergency Department, accompanied by a first aider.
- First aid kits are held by the First Aiders and are also located in the corridors.

- Emergency eye wash bottles are located in the corridors.
- Safety showers for chemical spills etc. are located in each laboratory.
- For any accidents involving a chemical spilt on the person, rinse the affected area for at least 15 minutes.
- Every accident or injury must be reported to the Site Departmental Safety Officer, either by the injured person, or by the attending First Aider.
- The Accident Report Forms must be completed as soon as the immediate incident is over. Blank accident forms are held by the first aiders and the Site Departmental Safety Officer.

4.4 **FIRE**

1. The arrangements for fire safety in the building are monitored by the Fire Safety Manager. Report any potential problems to her.
2. The University provides safety training for any person who wishes to learn more about fires and the use of fire extinguishers. This can be arranged through the Fire Safety Manager.
3. Make yourself familiar with the different types of fire extinguisher, their location, how to use them and what to do in case of a fire.
4. Also check locations of the nearest fire blankets and call points.
5. The fire assembly point for the building is outside the Judge Institute of Management Studies.
6. The fire alarm is tested at 8.45 am every Thursday morning, by a short activation of the sounders. At this time only, you do not need to leave the building unless the alarm continues to sound.
7. On hearing the fire alarm at any other time, all persons should evacuate the building by the nearest available exit, and assemble at the Fire Assembly Point. Before evacuating, and without taking risks, try to ensure that equipment and experiments are made as safe as possible.
8. Do not use the lifts as they may stop in a fire, not necessarily at a floor.
9. Do not re-enter the building once you have left, until you are told to do so by the Fire Manager, Fire Wardens or the fire brigade.

Discovering a Fire

- If you discover a fire, go to the stairs and operate the nearest fire alarm call point by pressing the red break glass.
- If possible, summon help and tackle the fire with a suitable fire extinguisher. Only tackle small fires and never place yourself at risk.
- The fire alarms go through to University Security. During working hours the University Security will wait five minutes before passing a call on to the fire brigade. In this 5 minutes, if the fire alert is known to be a false alarm, the call can be cancelled by an authorised member of the fire team, by contacting Security. If you know the alarm is genuine, do not wait 5 minutes, dial 1999 to ensure that the Fire Brigade has received the call and 101 to alert Security. If the University Security have not been contacted within the 5 minutes they pass the alarm to the Fire Brigade. Out of hours and Weekends the call is automatically forwarded to the fire Brigade.
- When you leave the building let the Fire Safety Manager at the front of the building know what happened and where the fire is.
- If you discover a fire Out -of -hours, you need to phone Security on 101 so that they can give the precise location of the incident to the emergency team and help them gain access to the building.

- All fires must be reported to the Fire Safety Manager in order to replace all empty and partially full extinguishers with fully-charged ones as soon as possible after use.
- All fires will be reported on a University Accident/Incident Form.

SECTION 5 SECURITY

The University is a target for thieves, as it is well known to have a lot of high value equipment and has free access to many buildings by a large number of staff and students. The University is also known to carry out research in a wide range of subjects, some of which are contentious to some groups and this can attract demonstrators.
All doors into the Department are protected by swipe card access points. Please take the following precautions:

1. Notify Biotechnology Reception of all your expected visitors.
2. Notify the Technical team if you are expecting repair engineers.
3. Ask all visitors including contractors, to check-in via Reception.
4. Do not let anybody unknown to you through an access-controlled door.
5. Do not leave access-controlled doors open.
6. Do not lend your access card to anybody.
7. If you lose your card, notify Biotechnology Reception immediately.
8. Report any suspicious activity to a member of the technical team or office staff. Or if out-of-hours, contact Security.
9. Make sure that you lock away all valuables, particularly laptop computers.
10. If you have to use the green emergency door break glass, to exit the building out - of - hours e.g in a power failure, notify Security.
11. Keep your personal information safe.
12. Do not cross protesters picket lines.
13. Do not enter into debate with protesters.

SECTION 6. LEAVING THE DEPARTMENT

The Department has many staff and students who work for varying periods of time and then leave. When you leave you must consider the safety of work that you have been involved with.

- In order to help you do this, the Department has a leaving form, which can be obtained from the office staff in Reception.
- The form asks you to consider various aspects of bringing your work to a safe conclusion.
- You are held legally responsible for the waste that is generated, which is why it is so important that you consider this at all stages of ordering, use and disposal of chemicals and materials.
- Anything left behind must be clearly labelled with contents, potential danger, date and originator, and must then be handed on to another responsible person preferably in the same Research Group.
- Do not under any circumstances, tip laboratory chemicals down the sinks.
- Toxic waste must be disposed of by a licensed contractor, and this is done using the University Chemical Waste collection system. Seek advice from the waste disposal technician.

SECTION 7. THE SAFETY OF THE BUILDING AND EQUIPMENT

The Department tries to keep the buildings and equipment in a clean, safe and working state. This can be very difficult to do, with such large amounts of very high specification equipment and complex services. Your help is appreciated in promptly reporting repairs and maintenance faults or problems.

7.1 REPAIRS AND MAINTENANCE

- The Department has a database on "Filemaker-Pro" called the "Support Requests Database", which is a place to record any problems and requests for help.
- This database is checked daily by the Technical Team, usually around 8 a.m.
- For urgent matters, verbally inform the Technical team.
- Do not send an e-mail to an individual member of the technical team, as this will not be read if they are away or not at their desk.
- Label faulty equipment, so that others do not attempt to use it. Add your name, the date and the problem as it may be helpful to speak with you to discover more facts.
- Computer faults are dealt with by requesting help directly from the IT Manager by phone or e-mail.
- It is the aim of the technical team to deal with all repairs and maintenance requests promptly and efficiently and to keep you up to date with the progress of repairs. If you want more information contact the Technical team.
- Problems are dealt with on a priority basis, for the Institute as a whole.
- When submitting faulty equipment for repair, you must decontaminate the equipment before handing it over. Only you, will know what the equipment is likely to have been used with.
- For equipment being sent to an external repairer, it is necessary both to decontaminate the equipment and to provide a decontamination certificate. See example attached as Appendix D.
- After a repair has been carried out, always check that the equipment has been returned as safe to use and that no parameters or buttons have been altered during the repair.

7.2.THE BUILDING

The condition of the building is looked after by Estate Management. Please report any faults or problems to the technical team who can contact the correct person.

- Do not modify or change parts of the building without consultation, as certain requirements e.g. fire regulations, are based on the fabric of the building and the room usage.
- One area of the building (Room 350) is at maximum weight limit, and further weight placed in the room could cause structural failure.

7.3 SERVICES

The building is highly serviced with various types of water supply, gases, drains, air handling and a wide variety of power supplies. Please do not interfere with any of these services, as they are highly specialised and have a complicated inter-relationship controlled by computer. It is essential that if you are calling out service or repair engineers yourself, you liaise with the technical team for safety requirements. Each lab has a sign with the emergency power turn off instructions for the electrics. Fume cupboards and

safety cabinets are serviced twice a year and checked for compliance with safety parameters. The services information is all held by the technical team, should you require further details.

7.4 PRESSURE VESSELS

The Department has a variety of pressurised equipment, some of which, require to be insurance inspected and safety checked on an annual basis. The technical team holds the "Written Schemes" and the schedules of inspection and arranges for the servicing and inspections to be carried out.

7.5 LARGE LAB EQUIPMENT

Some of the larger equipment has important safety considerations. Ask for advice in ordering and siting these pieces of equipment. Such pieces of equipment often have a Standard Operating Procedure (SOP) associated with them, explaining how to use the equipment. Sometimes a précis of usage instructions is displayed on the wall next to the apparatus. Service turn-off instructions should be sited next to the equipment. Some items of equipment have a usage log, which must be completed each time you use the equipment.

7.6 OTHER EQUIPMENT

Much of the smaller laboratory equipment, can still be hazardous if used incorrectly. Always read the operating manual prior to use and ask for help if you are uncertain.

7.7 LADDERS AND STEPSTOOLS

- The Institute has one ladder per floor. The Ladders are checked once a year for overall safe condition.
- Anybody using a ladder, must check the condition of the ladder prior to each use.
- Be sure to use ladders and stepstools, rather than chairs to access heights.
- Each area has a stepstool, to use when accessing items kept above head height.
- Step securely on the centre of a stepstool, as they can slip if you catch them off-centre
- Stepstools are also checked annually for condition.

7.8 LIFTS

- The building has 2 lifts.
- Lifts are regularly safety checked both by insurance assessors and the University Lift maintenance team.
- Report any faults to the technical team or office staff.
- Do not use the lifts if power problems are likely, such as in a fire, in a storm with lightening or when power interruptions are planned. The Goods lift, (which is the larger of the two lifts) trips out as soon as it sees any power fluctuation.
- An emergency call system is present in each lift, which directly contacts the security staff and still works during a power cut. This is accessed by a help button which is pressed to give a direct telephone link to Security.
- If you do get stuck in the lift, the University has trained engineers to extract you. In this case, take care when exiting, as you may not be exactly level with a floor.
- Both lifts are counterbalanced and are unable to fall.

- For moving difficult loads, the large goods lift has a key switch override facility, which can be used to send hazardous loads to a specific floor, with or without a person being present.
- This override facility without a person travelling in the lift must be used when transporting liquid nitrogen, liquid helium, other asphyxiants such as dry ice, radioactive waste, toxic waste, gas cylinders.

SECTION 8 - APPENDICES

APPENDIX A

FIRST AIDERS

First Aiders:	Tel. Ext.
Ms C. Heinrich	48857
Ms L. Hares	62313

First aiders are geographically listed at the end of the University phone book. Our site is listed under the Tennis Court Road/ Downing Site section.

Appendix B GENERAL RISK ASSESSMENT FORM 1

UNIVERSITY OF CAMBRIDGE
Chemical Engineering and Biotechnology

Risk Assessment - Form 1

Risk Assessment Reference

Name of procedure, activity or equipment:		
Research Supervisor:	**& CRSid:**	**Site & Location:**

1. THE WORK Main features of the procedure, activity or equipment. What will be done and how?

2. DANGERS Explain the main dangers or hazards. Consider potential harm to people, the environment and to equipment.

For work with higher or specialist risks you may need to attach specialist forms:

Specialist Risk	**What is covered?**	**What should you do?**	State 'N/A' or 'Attached' or give Ref
Chemicals (other than Harmful & Irritant)	Any substance with a Toxic, Very Toxic, Corrosive, Explosive, Flammable or Oxidising tag; work with dusts, fumes, nanoparticles and asphyxiants; pyrophoric substances.	Attach a Hazardous Substances Risk Assessment (Form 2). For high risk work, the risk assessment must also be considered by the Chemical Safety Group before work begins.	
GMO's	Any work with Genetically Modified Organisms, whether or not modified within the Department.	Attach GM Shortform (Form 3), GMA (Form 4) or GMB (Form 5). The form must be approved by the Biological Safety and GM Committee before work begins.	
Non-GM biologicals (other than simple HG1)	Work (not already covered by the GM forms above) which involves any human/animal samples, environmental samples, culturing of samples, or Hazard Group 2 or 3 substances	Attach Non-GM Biological Risk Assessment (Form 6). The form must be approved by BSO or the Biological Safety and GM Committee before work begins.	

Specialist Risk	What is covered?	What should you do?	State 'N/A' or 'Attached' or give Ref
Composite or high pressure rigs	Composite equipment built in-house (or equipment modified in-house) or equipment at high pressure (>0.5bar.g or containing steam).	Specify Rig Number (if known). Append Rig Form (Form 7). Permit to Operate must be signed by DSO before work begins.	Rig Number:
Lasers	Equipment which contains or comprises Class 3B or Class 4 lasers [except where the equipment is fully enclosed and interlocked and will not be serviced on-site].	Complete Laser Risk Assessment (Form 8). This must be approved by the Laser Safety Officer before work begins.	
Artificial Optical Radiation (non-laser)	Equipment which contains non-laser UV or IR light sources [except where equipment is fully enclosed and inter-locked and will not be serviced on-site]	See DSO who may need to help you complete a separate Artificial Optical Radiation Risk Assessment (Form 9).	
X-Rays	Equipment which generates X-Rays	Complete X-Ray Risk Assessment (Form 10). This must be approved by the RPS before work begins.	
Heavy lifting	Work which involves lifting significant loads (e.g. approaching 16kg lifted at waist height, or 7kg from the floor / head-height) or has other risk factors.	See DSO who may need to help you complete a separate Manual Handling Risk Assessment (Form 11)	
Radioactive Substances	No work with unsealed radioactive substances is currently permitted.	Please contact your RPS for further information	

If questions 3 to 6 are already answered adequately on attached forms then you do not need to provide duplicate answers here.

3. CONTROLS How will we stop that harm from happening? List the existing or intended 'controls' or precautions.

4. EMERGENCY ACTION Specify emergency and/or first aid procedures here:

5. WASTES How will any waste substances be disposed of?

6. FURTHER ACTION Specify anything further which could reasonably be done to reduce the risk. Specify any special training needed by Research Workers. Consider attaching a Standard Operating Procedure (SOP) for high risk work.

7. OTHER Any other important information. Is this work suitable for out-of-hours work, or lone work? Is it suitable for women of child-bearing age and/or pregnant workers? Is health surveillance required?

Assessment completed by:

Assessor:	**& CRSid:**	**Signature:**	**Date:**

These documents constitute a suitable and sufficient assessment of risk for the work specified:

Research Supervisor:	**Signature:**	**Date:**

For biological work not covered by supplementary forms, the BSO/Deputy must sign to confirm at HG1:

BSO or Deputy BSO:	**Signature:**	**Date:**

Risk Assessment Review Sheet

All risk assessment documents must be reviewed at least annually. They must also be reviewed when any significant changes take place, and after any relevant accident or incident.

This sheet can used to record reviews where there is no change or where there are small changes to the risk assessment which can easily be stated.

Date of Review	**Changes** Explain any changes here or state "None".	**Signature of Research Supervisor**

Research Worker Sign-Up Sheet

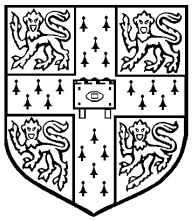
All Research Workers must sign onto the risk assessment. This sheet can also be used to record training when training is necessary.

			Training, if necessary, can be recorded in this Section.			
Research Worker Name[1]	**Research Worker Signature**	**Date**	**Signature of Trainer[2] (where applicable)**	**Date of Training**	**Signature of Research Supervisor[3]**	**Date**

[1] The Research Worker signs to confirm that they have read and understood the risk assessment and agree to abide by all the control measures specified in the assessment.

[2] The Trainer signs to confirm that they have trained the Research Worker to safely carry out the work covered by the risk assessment document(s) attached to this sheet. The significant hazards, and the necessary control measures, have all been explained to the Research Worker.

[3] The RS or designated (in writing) PDRA confirms that, to the best of their knowledge, the individual is suitably experienced, trained and/or supervised to safely perform this work.



APPENDIX C- LABORATORY EQUIPMENT

UNIVERSITY OF CAMBRIDGE

DEPARTMENT OF CHEMICAL ENGINEERING AND BIOTECHNOLOGY

Tennis Court Road
Cambridge
CB2 1QT

Repairs and Maintenance contact: Deborah Singh
Tel: 01223 766707 (direct line / answer machine)
email: dls25@ cam.ac.uk

DECONTAMINATION CERTIFICATE

LABORATORY EQUIPMENT DECONTAMINATION CERTIFICATE

NAME:	ROOM NUMBER:
SUPPORT REQUEST NUMBER:	

EQUIPMENT:

MAKE AND MODEL:

SERIAL NUMBER:

THIS EQUIPMENT HAS BEEN USED WITH:

	YES	NO
(a) BIOHAZARDOUS MATERIAL - CONTAINMENT LEVEL……	☐	☐
(b) HAZARDOUS CHEMICALS - TYPE…….	☐	☐
(c) RADIOACTIVE MATERIALS - ISOTOPE……..	☐	☐

IF “YES” TO ANY OF THE ABOVE, PLEASE STATE HOW IT HAS BEEN DECONTAMINATED.

I HEREBY CERTIFY THAT WHERE NECESSARY, DECONTAMINATION PROCEDURES HAVE BEEN CARRIED OUT ON THIS EQUIPMENT.

SIGNED:	POSITION:
TELEPHONE NUMBER:	DATE:

APPENDIX D NON-ROUTINE CHEMICAL WASTE DISPOSAL FORM

NO:

UNIVERSITY OF CAMBRIDGE
DEPARTMENT OF
CHEMICAL ENGINEERING AND BIOTECHNOLOGY
Tennis Court Road
Cambridge
CB2 1QT
Tel: 01223 334160 (Reception)
Fax: 01223 334162

REQUEST FOR NON - ROUTINE CHEMICAL WASTE DISPOSAL

NAME OF PERSON SUBMITTING:
DATE:

1.1 LOCATION OF THE WASTE

ROOM NO:
SPECIFIC LOCATION:

1.2 PRESENTATION OF THE WASTE

TOTAL AMOUNT- IN BAGS / g / VOLUME:

NUMBER OF CONTAINERS:

TYPE OF CONTAINERS:

ANY COMMENTS:

FULL NAMES OF ALL CHEMICALS PRESENT	CONCENTRATION OF EACH CHEMICAL	HAZARDS OF EACH CHEMICAL

Department of Chemical Engineering and Biotechnology, University of Cambridge

CURRENT POST-HOLDERS (HEALTH AND SAFETY), SEPTEMBER 2013

Post or Rôle	**Tennis Court Road Site** (Institute of Biotechnology)		**Pembroke Street Site**		**West Cambridge Site** (MRRC)	
Head of Department	Prof Nigel Slater	(7)62953	Prof Nigel Slater	(7)62953	Prof Nigel Slater	(7)62953
Director of Site	Prof Chris Lowe	(3)34157	N/A	N/A	Prof Lynn Gladden	(3)34762
Departmental Safety Officer	Ms Deborah Singh	(7)66707	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Assistant Safety Officer (MRRC)	N/A	N/A	N/A	N/A	Dr Mick Mantle	(7)66325
Fire Safety Manager	Ms Joanna Walker	(3)34079	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Deputy Fire Safety Manager	Ms Christine Heinrich	(3)34079	Dr Peter Foreman	(3)34776	Dr Peter Foreman	(3)34776
Buildings Safety Officer	Ms Deborah Singh	(7)66707	Dr Peter Foreman	(3)34776	Dr Peter Foreman	(3)34776
Radiation Protection Supervisor	Ms Deborah Singh	(7)66707	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Laser Safety Officer	Dr Colin Davidson	(7)67782	Dr Eric Rees	((3)3479 8	Dr Eric Rees	((3)3479 8
Biological Safety Officer	Dr Graham Christie	(3)34166	Dr Graham Christie	(3)34166	Dr Graham Christie	(3)34166
Deputy Biological Safety Officer	Ms Deborah Singh	(7)66707	Ms Roz Williams	(3)35064	Ms Roz Williams	(3)35064
Dangerous Substances Adviser	Ms Deborah Singh	(7)66707	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Chemical Safety Adviser	Ms Deborah Singh	(7)66707	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Laboratory Section Head	Ms Deborah Singh	(7)66707	Ms Roz Williams	(3)35064	Ms Roz Williams	(3)35064
Chemical Waste Co-ordinator	Ms Joanna Walker	(3)34079	Ms Roz Williams	(3)35064	Dr Mick Mantle	(7)66325
Chief First Aider	Ms Christine Heinrich	(3)34079	Ms Roz Williams	(3)35064	Dr Mick Mantle	(7)66325
Electrical Safety Adviser	Ms Wei-Yao Ma	(7)68667	Ms Wei-Yao Ma	(7)68667	Ms Wei-Yao Ma	(7)68667
Insurance Register Co-ordinator	Ms Deborah Singh	(7)66707	Dr Peter Foreman	(3)34776	Dr Peter Foreman	(3)34776
Asbestos Co-ordinator	Ms Deborah Singh	(7)66707	Dr Peter Foreman	(3)34776	Dr Peter Foreman	(3)34776
Departmental Catering Co-ordinator	Dr Tom Matthams	(3)34163	Ms Deborah Jacobs	(7)67087	Ms Deborah Jacobs	(7)67087
Disability Liaison Officer	Dr Tom Matthams	(3)34163	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782
Environmental Co-ordinator	Ms Joanna Walker	(3)34079	Ms Sarada Crowe	(7)62782	Ms Sarada Crowe	(7)62782