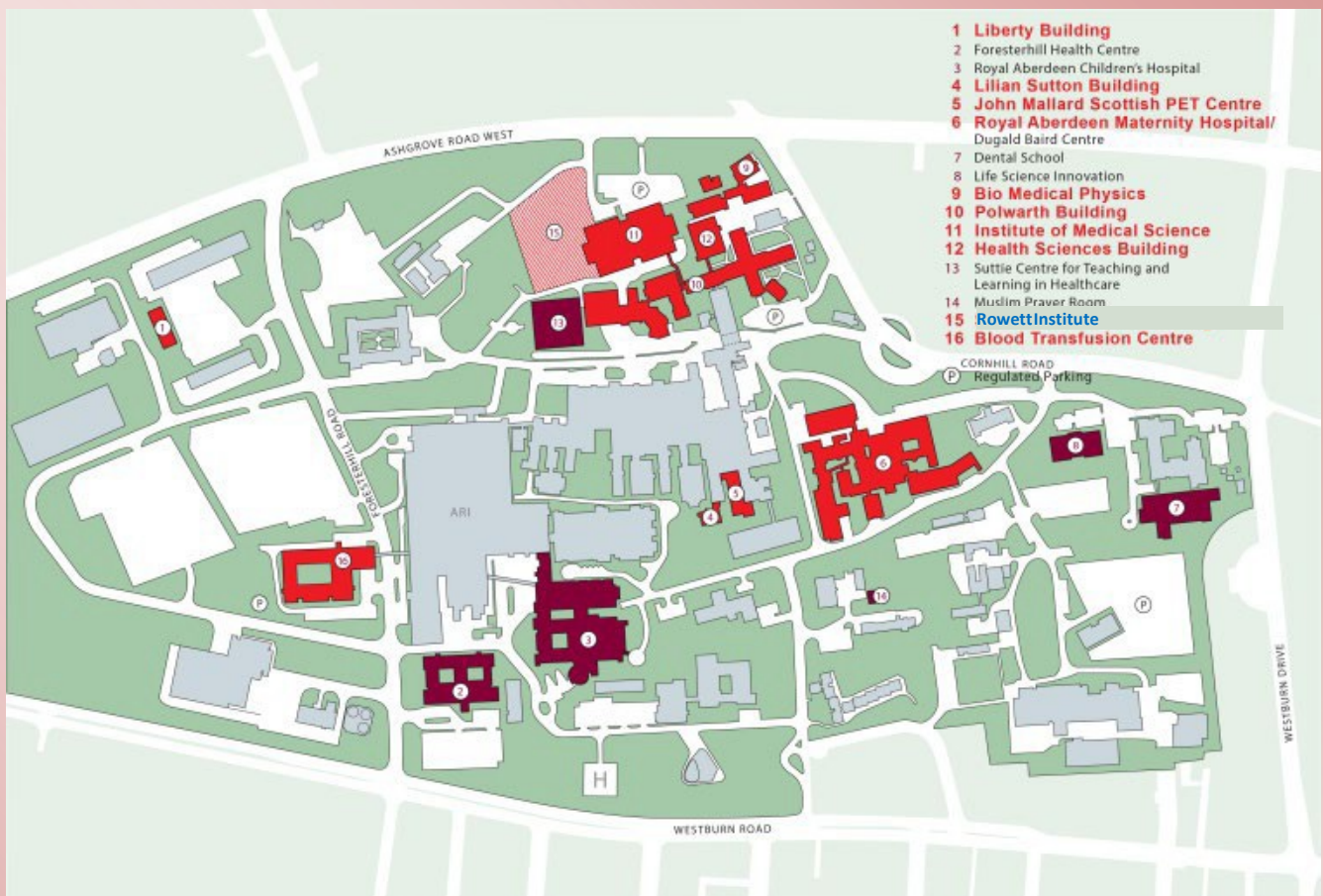


ROWETT INSTITUTE



Safety Handbook

May 2021 v10

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KEY CONTACTS

Prof Peter Morgan	Convener of The Rowett Institute H&S Committee	8663
Prof Siladitya Bhattacharya	Head of School	8447
Dana Wilson	Rowett Safety Coordinator (Lead) (Level 4), Radiation Protection Supervisor (Lead)	8752/8753
	Rowett Safety Coordinator (Deputy)	
Jeanette Ingram	Clerk to Rowett Safety Committee	8642
David McKenzie	Rowett Facilities Manager (TRM)	7467/7468
Susan Anderson	Safety Adviser (Level 2)	8622
Pat Bain	Safety Adviser (Level 2)	8670
Donna Henderson	Safety Adviser (Level 2)	8648
David Stead	Safety Adviser (Level 2)	7419
David Bremner	Safety Adviser (Level 3)/First Aid Coordinator	8785
Andrew Farquharson	Safety Adviser (Level 4)	8778
Claire Fyfe	Safety Adviser (Level 4)	8606
Raffaella Chianese	Lab Coordinator (Level 4)	8750/8751
Linda Petrie	Lab Coordinator (Level 4)	8641
Lynn Thomson	Lab Coordinator/ Deputy Radiation Supervisor (Level 4)	8753
Susan Hay	Lab Coordinator /Rowett Deputy Safety Coordinator (Level 5)	8756/8757
Jenny Martin	Lab Coordinator/ Safety Adviser (Level 5)	8730
Nick Hayward	Lab Coordinator/ Safety Adviser (Level 5)	8664
Helen Hayes	Safety Adviser (Level 5)	8720
Dr Steve McCallum	University Radiation Protection Adviser	76-53109
Mr Garry Fisher	University Head of Health, Safety and Wellbeing	2783
Dr Allan Petrie	University Senior Health & Safety Adviser	3896
Vivienne Amakiri	University Health & Safety Adviser	2514
	University Fire Safety Adviser	4786
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Statement from the Rowett Director

The Rowett Institute accommodates clinical and basic scientists from the School of Medicine, Medical Sciences and Nutrition. Responsibility for Health, Safety and Wellbeing issues within the Rowett rests with the Head of School who has delegated the responsibility to the Director of the Rowett, Rowett Health and Safety Committee and Lead Health and Safety Coordinator. In order to have a consistent approach across the whole of the Foresterhill site the Lead Rowett Safety Coordinator will liaise with the Lead IMS Safety Coordinator. Further details on the responsibilities of individual personnel and the Rowett Safety Committee can be found in the **Rowett Safety Handbook**. Please read through this handbook and have all the members of your team become familiar with its contents.

Health, Safety and Wellbeing is a core and integral aspect of the good business management and we want to ensure that the University provides a safe and healthy working environment.

A summary of the major principles of Rowett safety is provided in the **Rowett Institute Safety Summary Handbook**. This booklet summarises some important issues to allow safe working in the laboratory. However, it must not be used in isolation; links are provided to more detailed information that is available in the full safety manual on the web. For the benefit of everyone, we urge all staff and students to commit themselves to maintaining high standards of health and safety within the Rowett. We encourage anyone with suggestions to improve our procedures to discuss their suggestions with me or with one of the Rowett Safety Advisers.



Professor Peter Morgan
Director and Convener Rowett H&S Committee



Dana Wilson
Rowett Lead H&S Coordinator

July 2020

b) Responsibilities of the Director of the Rowett Institute

The Rowett Director will:

- develop, implement and maintain an effective Health, Safety and Wellbeing management system which is appropriate for the Institute and which meets the requirements of the University Health, Safety and Wellbeing Policy;
- provide a Health, Safety and Wellbeing Policy for the Institute and, in consultation with the Head of School, ensure provision of resources necessary to implement the Policy;
- appoint local Safety Coordinators to provide advice and assistance with Health, Safety and Wellbeing matters;
- set up a Health, Safety and Wellbeing Committee to keep under review the Health, Safety and Wellbeing arrangements in the Institute, to make recommendations for improvements and to provide a forum for discussion of Health, Safety and Wellbeing issues; and
- bring to the notice of the Head of School any Health, Safety and Wellbeing problem which is not resolved in a timescale commensurate with the level of risk.

c) Responsibilities of Group Leaders/Principal Investigators

Group Leaders/Principal Investigators are responsible for implementing the Rowett Health, Safety and Wellbeing Policy in their areas of control. In implementing the Policy, they will:

- ensure that all hazards creating significant risks are identified and that necessary steps are taken to reduce the risks to acceptable levels;
- ensure that Health, Safety and Wellbeing training is adequate for all staff and students in their control to ensure their competence in safety critical activities;
- ensure that necessary supervision is provided for all staff and students in their control;
- ensure that all premises and equipment in their area of control are maintained in an acceptable condition; and
- make arrangements to monitor whether staff and students in their areas of control are complying with the Rowett Health, Safety and Wellbeing arrangements.

d) Responsibilities of all Supervisors

Any persons undertaking supervisory roles will:

- ensure that all staff, students and visiting workers under their control work in accordance with Rowett procedures.

e) Responsibilities of all staff and students

All staff and students must:

- co-operate and comply with the Health, Safety and Wellbeing arrangements put in place by the Rowett Director;
- do all they can to ensure that their activities do not pose a risk to others;
- if they are aware of something which they believe is unsafe, either take immediate steps to make it safe or bring it to the attention of a person who can do something about it;
- if they become aware of deficiencies in the Rowett Health, Safety and Wellbeing arrangements, bring these deficiencies to the attention of their immediate supervisor; and
- not interfere with, or misuse, anything provided for reasons of Health, Safety and Wellbeing.

f) Responsibilities of Rowett Local Safety Coordinators

Local Safety Coordinators, Safety advisers and Lab Coordinators in the Rowett will:

- maintain an up-to-date understanding of the type of work and safety risks of the work in their charge and visit each lab on a regular basis to speak with staff;
- introduce themselves to new staff and students and instil approachability;
- provide advice to the Convenor of the Health, Safety and Wellbeing Committee and to all members of the School on Health, Safety and Wellbeing matters;
- undertake inspections of the Rowett activities as commissioned by the Director of the Rowett;
- liaise with the Central Health and Safety Team, on all matters relating to Health, Safety and Wellbeing within the Rowett building and to communicate these to the Rowett Health, Safety and Wellbeing Committee as appropriate.

g) Arrangements for dealing with Health, Safety and Wellbeing concerns

It is expected that Health, Safety and Wellbeing concerns will be resolved by discussions within the Rowett. An individual member of staff or a student should discuss initially with their line manager/supervisor or with a Rowett Safety Coordinator. If the matter is not resolved in this way it should be brought to the attention of their Head of School.

h) Rowett Safety Committee Meetings

Regular meetings of the Rowett Safety Committee, chaired by the Rowett Director, will address Health, Safety and Wellbeing matters. The remit of this committee is to:

- provide a forum for discussion of Health, Safety and Wellbeing matters and to recommend actions required to improve Health, Safety and Wellbeing within the Rowett;
- produce a Safety Handbook for the Rowett and to monitor compliance with the procedures in the Handbook; and

Particular matters that the Committee will consider include:

- reports on Health, Safety and Wellbeing inspections of the facilities;
- reports of all accidents and near misses;
- the Health, Safety and Wellbeing content of training for staff and students; and
- Health, Safety and Wellbeing information provided for staff and students and its communication.

If any student or member of staff has a matter they wish the committee to discuss they should contact their immediate supervisor, a Rowett Safety Coordinator or one of the members of the Rowett Safety Committee.

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3. Review of the Rowett Safety Handbook

Each year this Rowett Safety Handbook will be revised and reissued, if necessary, within three months of the annual review of the Health, Safety and Wellbeing arrangements by the Rowett Safety Committee.

Each group should download and place a printed copy of the **Rowett Safety Summary** in the laboratory. Copies should be made available for honours level undergraduates to consult. Relevant sections of the handbook will be incorporated into undergraduate or postgraduate course documentation.

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4. Risk assessment

Risk assessment is the process of:

- identifying where there is a significant risk (*i.e.* danger) in an activity and
- determining how that risk can be decreased to an acceptable level (*i.e.* working out how the activity can be done safely).

Risk assessment is fundamental to the effective management of Health, Safety and Wellbeing. The University is obliged by law to ensure that risk assessments are done and there is also a legal requirement to record the 'significant findings' of risk assessments in writing. The 'significant findings' are precautions that need to be taken when doing particular activities.

A good risk assessment is one which concentrates on the main dangers, ignores the trivial ones and records the 'significant findings' in such a way that will help those undertaking the work to do it safely.

Risk assessments must be reviewed, and be signed and dated as having been reviewed, at least every two years or when there are significant changes to the work.

Purpose of risk assessment

The purpose of risk assessment is not to produce a form that is forgotten about. It is to decrease the likelihood of danger in the laboratory. The work should be discussed and committed to writing in sufficient detail to achieve this purpose.

Risk assessment process in the Rowett Building

1) Within the Rowett the risk assessment process has been made an integral part of the Standard Operating Procedure (SOP) process required for Quality Assurance or recording/development of a method. This ensures that new laboratory workers are

briefed on the findings of the risk assessment at the same time as they are trained in the method for the experiment.

2) The risk assessment need consider only those risks which are not adequately controlled by what will be described as “standard laboratory precautions”. We work in an environment where many of the risks in our labs are addressed by standard lab precautions. We would expect staff and students at the Rowett should have a level of experience and training to be able to understand and comply with these precautions when entering a lab environment.

Standard lab precautions include;

1. Howie Style Lab coats to be worn in all labs at all times.
2. No eating, drinking, applying makeup, putting pens in the mouth or taking of medication allowed in lab areas.
3. Eye protection must be worn in all labs - exemptions only allowed if approved by the Rowett H&S committee – see Q Pulse Form 467
4. When diluting acid, always wear a safety visor, acid resistant gloves. Acid should always be added to the water; never the other wayround.
5. Wear protective gloves when necessary. Remove glove/s if you are going to touch anything that someone else might touch without gloves (e.g telephone, computer keyboard and importantly door handles).
6. Understand the chemicals you are working with. Ensure safe weighing of general laboratory chemicals by checking hazards and wearing appropriate PPE (gloves and /or mask) if in doubt ask an experienced member of staff.
7. Safe use of general laboratory equipment - ensure you have had training on the equipment you are using, if in doubt ask an experienced member of staff.
8. Always seek advice on use of equipment you are unfamiliar with.
9. Ensure all solutions are clearly labelled with contents, Solution A is not appropriate, another lab worker will not know what this is. Writing on the bottle with marker pen is not sufficient. Use QA labels for sub stocks to ensure traceability
10. Make sure work areas kept clean and tidy.
11. Make sure sink areas are kept clean and tidy.
12. Clean any spills immediately.
13. Use the correct disposal route for all waste generated.
14. *NEVER* re-sheath needles.
15. Wash hands thoroughly after using hazardous materials and on leaving laboratories

It will not be necessary to record the risks which will be satisfactorily controlled by these standard lab precautions.

There are three ways in which a method/procedure can be documented:

- a Standard Operating Procedure through the QA office (this is the preferred route), or
- on a Method sheet or
- by simply recording it in a lab book if method development is occurring.

The SOP or Method sheet includes a risk assessment section which must be filled in.

- Where risks are found which are additional to those which can be controlled by standard laboratory precautions this will take the form of a table. The table will contain 3 sections; task, hazard/risk and control measures.
- Procedures which do not have any additional risks associated with them can be identified with the statement in the risk assessment section: "No additional risks to those which will be controlled by standard laboratory precautions".

A similar process should be followed for method sheets and records in lab books.

For examples of risk assessed methods go to Q-pulse

<http://qpulse-ap-1.uoa.abdn.ac.uk/QPulseWeb/>

MET 0212, MET 049, MET 0497, MET 1024, MET 1144 are some examples which can be found by using the search function in Qpulse.

Risk assessment in postgraduate work and undergraduate 'Honours' projects.

For research work involving postgraduate students, the University Court has said that supervisors must ensure

"Postgraduate projects are assessed for Health, Safety and Wellbeing risks" and "Necessary precautions are agreed with the postgraduate (and in all but the most elementary circumstances are committed to writing)".

The University Court has said that undergraduate honours projects should be treated in the same way as postgraduate projects. Risk assessments for both postgraduate projects and undergraduate honours projects follow the same method described below.

Risk assessments for research work in the laboratories involving postgraduate or undergraduate 'honours' students must follow this method for risk assessment. Supervisors are responsible for ensuring that it is followed. The purpose is to ensure that students appreciate where dangers lie in the work they are about to undertake and understand the precautions they will need to take to ensure the work is done safely.

Supervisors are responsible for deciding to what extent necessary precautions should be committed to writing.

- 1) Student and supervisor should examine the dangers associated with the work before it begins. They should discuss the techniques available to enable the work

to be done safely. The supervisor should ascertain whether the student is aware of the sections in this handbook that are relevant to the work.

- 2) The student should then be asked to write a summary of the dangers and precautions that will be necessary to do the work safely. This will constitute the 'significant findings' of the risk assessment. The supervisor should give guidance as to the level of detail required. More experienced students, in whom the supervisor has confidence, will require less detail than less experienced students.

The student should be asked to:

- record the risk assessment in their laboratory notebook.
 - acknowledge the document in Q-pulse if the method has already been risk assessed
- 3) If the student will be following existing laboratory protocols which already contain full details of the Health, Safety and Wellbeing precautions required, the supervisor may permit the student to make reference to these protocols in the risk assessment instead of having to write out the precautions again.
 - 4) The supervisor should then review the written record of the assessment and sign it before the work can begin.
 - 5) The student must retain the assessment record as long as the work continues and must be produced, if required, during Health, Safety and Wellbeing inspections.
 - 6) The student must understand that significant alterations in the agreed procedure must not be introduced without the supervisor's knowledge. Regular discussions between the student and supervisor should be held to ensure that all risk assessments remain valid. Any significant changes will require revision of the record of assessment and signature of the supervisor

Risk assessments for new and expectant mothers

Note that **all existing** risk assessments **should already record hazards** associated with substances or procedures that can cause harm to reproductive organs, or to the unborn child in the period immediately following conception, or that could be hazardous during pregnancy or breastfeeding.

Due to the hazardous nature of many of the chemicals in use in our labs it is prudent to assess the risks associated with all procedures at the earliest stage of pregnancy – or ideally even before conception. While you do not have to inform the University that you are pregnant or breastfeeding, you are encouraged to let your supervisor or line manager and your co-workers know as early as possible so that steps can be taken to protect you and your child's health. Your supervisor or line manager will carry out a risk assessment with you so that any necessary changes can be made to your own, or your co-workers', work practice. If you prefer, you can meet your Human Resources Advisor (for students, a Student Support Officer) or a local Safety Coordinator. There is guidance available and a checklist of matters to be considered in HSE documents which you can find at the University H&S web-site: <http://www.abdn.ac.uk/ims/documents/pregnancy-risk-assessment.doc>, where a risk assessment form for new and expectant mothers can be found.

Due to the dynamic nature of pregnancy, the assessment should be reviewed on a regular basis.

Facilities for resting, or expressing and storing milk when breastfeeding

Facilities are available in the first aid rooms in the IMS (room 1:56) or Polwarth building (room 0.004). A lockable refrigerator can be placed in the first aid room for milk storage: please ask TRM.

Risk Assessment - Questions to consider

The object of risk assessment is to predict circumstances which could lead to danger, devise measures which will minimise that danger and write it down. You must carry out a risk assessment for every procedure even if you conclude there is no risk. When assessing risk, note that you have a duty of care to yourself, to others in the building, to visitors and to the public at large.

“List potentially harmful chemicals and organisms to be used together with their main hazards”. Are radioactive materials or genetic manipulation involved? If yes, specify.

Here you are asked to identify potentially hazardous compounds that you plan to use, *e.g.* acetone (flammable), cyanide (poison). Remember micro-organisms, plants and animals can also be harmful so include these. Look up the properties of the compounds/organisms in data sheets to determine their hazards, any LD₅₀ and occupational exposure limits and ACDP hazard groups. Use your intelligence - the information in data sheets is often written on the assumption that you have a large quantity of the chemical for industrial use. If the chemical has not been assessed for toxicity, look up related chemicals and extrapolate. Your general knowledge will also help. While it does not pay to be over-cautious, err on the safe side for unknown materials. Find out the likely route for the materials to enter the body, *e.g.* vapour or dust which may be inhaled. If radioactive materials are to be used remember you **must** be registered with the University of Aberdeen as a radioactive isotope user and your work must meet the appropriate requirements and be approved by the Radiation Protection Coordinator (see Ionising Radiation Safety Arrangements and Rowett Local Rules for Ionising Radiation).
<https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#ionising-radiation>

If your work involves genetic manipulation or wild-type microorganisms at containment level 2 or 3, it must be approved by the Foresterhill Biological Safety Committee.

Do any chemicals/organisms pose a risk to a pregnant woman/foetus/breast-fed infant? If yes, specify

You should highlight any chemicals or organisms that affect the reproductive system and that may be harmful to an unborn child. You should also consider whether

any of these chemicals might pass into breast milk and therefore pose a hazard to a breast-fed infant. This will allow women to assess the risks of any procedures **prior** to conception as many teratogenic effects occur at the very earliest stages of pregnancy often before a woman discovers she is pregnant.

Which parts of the planned operations might create significant risks?

This question asks you to think of the operation as a whole, *e.g.* will there be naked lights or sources of sparks when you are using acetone? Are you going to be using incompatible chemicals or generating ones which are unstable or otherwise hazardous. Having regard to the hazard data, ask yourself if the quantities to be used provide a significant risk, but remember that the largest quantity to be handled is often in the stock bottle. How do you plan to pipette safely? Is any equipment going to be left running unattended at night? Think how you are going to store the materials involved safely. Don't forget to include the more mechanical hazards, pressure, vacuum, UV and other radiation, rotating machines, lifting and electrical.

Waste disposal procedure

It is your responsibility to dispose of all waste safely. This will include everything from paper tissues to syringes and solutions. Your main problem may well be the stock solutions and any unwanted chemicals in their original container. Remember also that the washing-up service and even the workshop may come into contact with your dirty apparatus. Since you also have a duty to them you may need to consider if it is necessary to rinse all items used before sending them away for cleaning/repair.

Precautions that will minimise risks

You should consider how to minimise the problems you have identified, *e.g.* if you are using acetone you must not use naked lights, if the compound has a toxic or carcinogenic vapour you must use a fume hood, if the compound is harmful to the skin or eyes, gloves and/or eye protection are required. What level of biological or other containment is needed? Guards may be required for rotating equipment and a lifting procedure might be necessary. Will supervision/training or even vaccination of the operative be required? Whatever you decide, this should be incorporated into your working protocol.

In the event of an accident are there procedures that should be followed in addition to standard lab precautions

This is for you to devise emergency procedures, *e.g.* what would you do if you drop the stock bottle, get some in your eye or on your skin? Think about it and be prepared.

Risk assessments are not forever. Periodically, and/or if there has been a change in the working protocol, the assessments must be reviewed to ensure they are up-to-date. This review must be signed by all users and dated. PIs are required to inform the QA office of any changes to the SOP/Method distribution lists.

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5. Health and Safety training and Wellbeing

Health, Safety and Wellbeing training will be provided for staff and students as follows:

1) All new staff and students will receive induction training during the first month of employment. An individual's immediate supervisor is responsible for ensuring that training is provided. A training and competency form will be provided in the Rowett Induction pack. It is expected that supervisors and group leaders will maintain this record of what training each new member of staff or student receives.

2) All postgraduate students carrying out laboratory-based research work will receive specific training in laboratory safety. The project supervisor will provide this or designate this task to a senior member of the lab. Good laboratory practice and risk assessment training will be given at the start of the project and will form part of the induction training procedure. Training in more specific procedures to be used in the laboratory will be given as deemed appropriate by the supervisor. A general safety-training course, including laboratory safety, is arranged by the Graduate School and usually run in October/November each year. Students are required to attend this. Students who fail to complete induction training must be given training by supervisors before being permitted to work in laboratories. Records will be recorded on the training and competency form which should be maintained within the labs.

3) Other, more specific courses on safety matters are organised by the Central Health and Safety Team. These are held throughout the year, and staff are encouraged to attend courses that are appropriate. Staff must attend those courses if it is necessary for the safe undertaking their work.

4) The most recent copy of the **Rowett Safety Summary** MUST be available as a printed version in each laboratory. This Summary document, like the full Rowett Safety Handbook, is also available at www.abdn.ac.uk/rowett/Intranet/safety/ and will be updated periodically. Notification of important amendments will be emailed to all staff/students within the Rowett building. It is the responsibility of the laboratory coordinator to keep the version in the lab up-to-date. Staff and students must acknowledge that they are aware of how to access the handbook, and have read and understood the implications of its content.

5) Training courses for topics that are not mandatory are nevertheless of great value. No person can receive too much Health, Safety and Wellbeing training and more staff with up-to-date knowledge from experts will benefit the management of the Rowett Health, Safety and Wellbeing policy. Training records will be reviewed, at least annually, and the needs for further training identified.

5a. Health, Safety and Wellbeing

The major focus of this Handbook has been to provide clear guidance on how we handle and manage health and safety within the Rowett Building. The University has set the goal of improving the wellbeing of its staff because it sees this as an integral component toward the University becoming a successful and healthy environment in

which to work. Hence the new term, of Health, Safety and Wellbeing, indicates the importance that Wellbeing will have on staff.

The occupational health service provides support and guidance to University management and a health surveillance service to staff (see [procedure P.28 Occupational health](#)). The University also provides a Counselling service for staff as well as access to wellbeing coordinators and an employee assistance programme <http://www.abdn.ac.uk/staffnet/working-here/employee-assistance-programme.php>

In addition, the Central Health and Safety Team arranges open days throughout the University to encourage healthy lifestyles, promote healthy activities provided within the University and offer medical and nutritional information to help staff understand and, perhaps, avoid problems. There are many staff in the Rowett involved in diverse medical and nutritional aspects of research and they are actively encouraged to engage in passing on their knowledge to other staff and the local public.

There is a SafeZone app to connect staff and students to the University security team if you ever need urgent help, first aid or if you have an emergency while on campus. This allows security to identify your location and deal with first aid or emergency calls. Staff and students are urged to add this app to their phone. The details, for staff (<http://www.abdn.ac.uk/staffnet/working-here/safezone.php>) and students (<http://www.abdn.ac.uk/infohub/safezone.php>) are available on the University web pages.

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6. Health, Safety and Wellbeing inspections

- 1) The Director of the Rowett will commission Health, Safety and Wellbeing inspections of the facilities' activities at least two times per year. The purpose of the inspections is to ascertain the extent of compliance with the Health, Safety and Wellbeing arrangements described in this handbook.
- 2) All laboratory areas under the remit of the Rowett H&S committee will be inspected at least annually .
- 3) A checklist based on the Health, Safety and Wellbeing arrangements described in this handbook will guide the inspection team. A checklist is included that may be used ([6a – Inspection checklist](#)) Matters to be examined during the inspection will include:
 - compliance with procedures for specific hazards;
 - adequacy and review of documented risk assessments;
 - adequacy of understanding of the Health, Safety and Wellbeing arrangements and the assessment of risk by staff and students (particularly students under supervision);
 - completeness of Health, Safety and Wellbeing training and competency records;
 - emergency response arrangements; and
 - arrangements for inspection and maintenance of premises, equipment and completeness of records of inspection and maintenance.
- 4) The Rowett Safety Coordinator will produce a report for the Director, and this will include:
 - (a) positive findings, as well as details of location and significance of any failings discovered;
 - (b) recommendations for remedial action, including timescale and priorities; and
 - (c) suggestions as to who should undertake particular remedial actions.

The reporting process should not delay remedial measures or prevent immediate action if there is a risk of serious injury or ill health. The Director of the Rowett will confirm the suggested remedial action and ensure that the appropriate person responsible for taking the action is informed.
- 5) A follow-up inspection may be arranged specifically to ensure that necessary remedial action has been taken and is effective. If remedial action is not completed, then the Lead Safety Coordinator should discuss with the PI involved and report to the Rowett Director on the discussions.
- 6) It is the responsibility of supervisors and group leaders to perform checks at regular intervals in between Safety Committee inspections to confirm that the requirements of the Rowett Safety Handbook are being satisfied and that

adequate records are being kept. An example of the areas which supervisors/group leaders could address are:

Staff

- Have all staff read the current Rowett Safety Handbook?
- Do all staff understand who is responsible for Health, Safety and Wellbeing?
- Do all staff know what to do in the event of accidents/fire/spillages?
- Do all staff know who can provide safety advice?
- Have all staff undertaken appropriate training for the work they are doing, including equipment usage, radioactive work, etc?
- Can training and competency records be produced?
- Are staff informed by supervisors of the need to be vaccinated against hepatitis B if handling unscreened samples?
- Are protocols and written assessment of risk available for all procedures?
- Is everyone working in the laboratory wearing a Howie Style lab coat and other appropriate protective clothing?
- Are lab coats stored appropriately?
- Do all staff know about waste streaming?
- Are staff aware of rules about lone working and out of hours working?

Laboratory

- Are floors clear, no trailing wires, no papers on benches, no outdoor coats, bags, etc?
- Are appropriate warning notices displayed – UV, radioactive areas, etc?
- Are unscreened blood samples used? If so, are Containment level 2 rules in operation?
- Are acids/alkalis/solvents stored correctly? Are staff aware of how to dispose of them?
- Are drugs/carcinogens stored correctly?
- Are kick stools or steps available for access to heights?
- Is waste removed promptly?
- Are the procedures for transport of liquid nitrogen understood?
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6a. Rowett Safety Inspection Checklist

Lab Room No:		Supervisor(s):	
Autoclaves and pressure cookers - general state & regular inspections			
Balance area cleanliness			
Biohazards and biological waste – CL2 local rules, etc.			
Centrifuges and rotors - cleanliness and maintenance			
Chemicals and solvents - storage, compatible materials, ability to deal with spills - waste properly labelled, level of accumulation			
Computer workstations assessed			
Containment level and knowledge of associated rules			
Cryogenics			
Electrical equipment - general state & PAT testing, no trailing cables/overloading			
Electrophoresis equipment - general state			
Fire - extinguishers in place and uncluttered, exits clear and signposted			
Fume hoods – tidiness			
General housekeeping - state of lab, tidiness, etc. no eating, drinking, smoking, limited papers and books on bench no outdoor clothes in lab wearing of lab coats, eye protection			
Glassware general state, chipped or cracked items			
Heating/ventilation and lighting, lab fabric <i>i.e.</i> state of flooring and benches			
Knowledge of safety policy			
Labelling of reagents, equipment, centrifuges, etc.			
Radiation area – tidiness and adherence to local rules			
Risk assessment of methods used – regularly reviewed, awareness of main issues			
Sharps bins, broken glass bucket – not overfilled, no accumulation			
Storage general and high level			
Training and competency records			
Tubing for gas and water, security of connections			
Waste accumulation			
Comments:			
Inspectors:		Date:	

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7. Postgraduate and honours students

The University Health, Safety and Wellbeing Policy states:

- (a) Each School must make arrangements to provide postgraduate students with such supervision as is necessary to ensure their Health, Safety and Wellbeing.***
- (b) The duty to supervise postgraduates is delegated by the University to the Director of the Rowett and thence to the member of staff directly responsible for the postgraduate.***
- (c) New postgraduates should be trained in Rowett Health, Safety and Wellbeing policies and procedures.***
- (d) Supervisors must not discharge their duty to supervise by relying solely upon a postgraduate's status or apparent competence. They must be able to demonstrate that they have exercised an active supervisory role.***
- (e) Active supervision does not usually mean constant attendance. However, Supervisors must ensure:***
 - Postgraduate projects are assessed for Health, Safety and Wellbeing risks***
 - Necessary precautions are agreed with the postgraduate (and in all but the most elementary circumstances are committed to writing)***
 - Regular checks are carried out to ensure that the postgraduate is working to the agreed procedures***
 - Postgraduates understand that significant alterations in agreed procedures must not be introduced without the supervisor's knowledge.***
- (f) Arrangements must be made to cover for the temporary absence of a postgraduate's normal supervisor.***

The relationship between supervisor and student is a critical factor in ensuring safety in postgraduate research. Supervisors must ensure that students are competent to carry out practical work safely and students must work in accordance with procedures agreed with their supervisors.

Some postgraduate students will have completed a first degree at Aberdeen and may already have demonstrated competence in Health, Safety and Wellbeing matters to staff in the Rowett. However, staff will have very little knowledge of the abilities of students coming to Aberdeen from other institutions. These students will need to receive training in Rowett Health, Safety and Wellbeing procedures and be under

close supervision during the early stages of postgraduate study. (See also section 5, "[Health, Safety and Wellbeing training](#)").

The supervisor or delegate will be responsible for Health & Safety induction and training. An initial induction should be carried out within the first month of a student arriving, and recorded on the **Training, Awareness and Competence** record. The aim of this training is to ensure that students have a general introduction to Health, Safety and Wellbeing procedures of the Rowett. An H&S induction lecture will be organised by the Graduate School in October of each year for new graduate students. After this generic training, the supervisor will continue to provide the necessary training in more specific procedures that are required for the particular project, updating the **Training, Awareness and Competence** record as appropriate. This record must be kept in the laboratory/office to allow for their inspection as required.

1) Supervisors must ensure that postgraduate students appreciate the dangers in the work they are to carry out and understand the precautions to be taken. **It is mandatory that supervisors require postgraduate students to produce written Risk Assessments for any laboratory work.** The supervisor must approve the assessment before work may begin (see Section 4 in this handbook – "[RiskAssessment](#)").

2) Students must be made aware that unauthorised initiatives are not permitted. Students must work within the scope of the agreed risk assessment and discuss with their supervisor before making significant changes.

3) Supervisors must tell their students where help and advice can be obtained when the supervisor is not available.

4) Whenever a supervisor is absent for more than three working days, their students must be informed. It must be made clear to the student what they should do in relation to Health, Safety and Wellbeing matters that may arise during their absence. At such times, another supervisor must first approve any significant changes to procedures. Appropriate arrangements should be made when longer spells of absence are likely to occur.

Shared project supervisors

In certain circumstances, two members of staff may propose a project entailing laboratory work in two areas. Health, Safety and Wellbeing management cannot be managed efficiently on a shared basis. To overcome this, the following steps must be taken when two members of staff are jointly involved in an undergraduate or postgraduate project.

For the purpose of Health, Safety and Wellbeing management, the student must have one supervisor, who must ensure that the procedure described above for postgraduate students (items 1-4) is followed. At their initial meeting, supervisor, co-supervisor and student must clarify who is responsible for the Health, Safety and Wellbeing management of the student and all risk assessments must be discussed and signed by that supervisor.

Independent work by honours undergraduates

Undergraduate students do practical work as part of their honours year. This work must be supervised to at least the same extent as new postgraduates. In some cases, much higher levels of supervision may be required. The preparation and agreement with the supervisor of an adequate risk assessment before any independent work begins is critical (see section 4 – [“Risk assessment”](#)). Undergraduates are not allowed to work unsupervised in the laboratory outside normal working hours

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8. Accident investigation and reporting

Staff and students must report all accidents, as soon as possible, to their immediate supervisor or lab coordinator. The following must be reported:

- any incident in which anyone is hurt (regardless of how minor the injury might appear at the time and regardless of whether medical attention was required);
- any incident in which someone could have been hurt (a “near miss”). These are unplanned incidents which did not result in injury or ill health but which might have done so if the circumstances had been slightly different.

Accident or Near miss reporting should be completed online. Forms for both are available at <http://www.abdn.ac.uk/safety/general/accidents/>.

The most important reason for reporting accidents is to enable us to take action to prevent a similar accident occurring in the future. The University may also need to report the incident to the *Health, Safety and Wellbeing Executive* (HSE) or to our insurers.

Procedure

- 1) Accident or Near miss report forms should be filled in on-line at <http://www.abdn.ac.uk/safety/general/accidents/>.
- 2) The form must be completed within 48 hours of the accident by the immediate **supervisor** of the injured person, first aider or the person in charge of the area where the incident happened (and **not by the injured person**). In the event of the supervisor’s absence, a Rowett Safety Coordinator or Lab Coordinator will complete the form.
- 3) Completed forms are automatically sent to the Central Health and Safety Team, **and Rowett Lead Safety Coordinator. The Rowett Safety Coordinators will inform the Director of serious accidents or near misses.**
- 4) **Serious accidents (those that require attendance to Accident & Emergency)** must be reported **immediately** to the Central Health and Safety Team by telephone (ext. 2783, 3896 or 07481 850414). They will ensure that the Health and Safety Executive and our insurers are notified where necessary. Any incident involving ionising radiation must be reported by telephone to the University Radiation Protection Coordinator (Dr Stephen McCallum; 76-53109) and to a Rowett Radiation Protection Supervisor. All incidents should be formally reported using the on-line reporting form as above.
- 5) The member of staff responsible for the injured person must initiate an investigation into the accident to discover the cause. They should contact the Rowett Safety Coordinator if they need assistance.

6) If the accident is reportable to the Health and Safety Executive (Central Health and Safety Team will indicate whether it is), the Head of School must receive a copy of the accident report and the results of the investigation into the accident.

7) A report must be completed which should include details about:

- the incident;
- the injured person;
- the injury;
- what happened (including the cause of accident and precautions which could have been taken to avoid the accident);
- any witnesses;
- the supervisor signing the report.

Checklist for accident investigation

The following checklist is included as a guide to structure investigations and written reports. For further assistance, contact a Rowett Safety Coordinator.

1) Obtain basic facts

- Names of injured/witnesses/people early on scene
- Condition of any equipment
- Any chemicals/substances in use or present
- Layout of area
- Place, time, conditions
- Extent of injury/damage/disruption
- Make use of camera/sketches/measurements of undisturbed scene.

2) Establish circumstances

- What was being done at the time and what happened?
- Immediate causes
- Events leading up to the incident
- Any evidence linking pre-existing ill health status to work
- Competence (extent of training before event, experience in the job; were they aware of the dangers of the activity?)
- What was established method; was it adequate; was it followed?
- Behaviour and actions of individuals
- Supervisor's role: did they request the task to be done or did those involved in the accident act on their own initiative?
- What was the worst that could have happened?
- Has it happened before?
- Could it happen again?

3) Identify preventative measures

Review the risk assessment for the activity. What precautions should have been in force? What training should those involved have received?

What precautions were actually taken and what training was actually given? Compare these with what should have been the case.

4) Was first response to the accident adequate?

Was prompt and appropriate action taken? (*e.g.* making safe any continuing risk; electrical isolation; suitable fire-fighting; effective first aid; correct spillage procedures).

5) Identify underlying causes - *e.g.*

- Management or supervision failure
- Lack of competence
- Inadequate training
- Shortcomings in original design of equipment
- Absence of maintenance system.

6) Determine action needed to prevent a recurrence

Actions to prevent a recurrence might include:

- improve physical safeguards
- introduce better test and maintenance arrangements
- improve work methods
- provide and use personal protective equipment
- change supervision and training arrangements
- review similar dangers elsewhere in the Rowett/IMS site
- review procedures involving external contractors
- improve inspection systems.

In determining the course of action, the information in the Rowett Safety Handbook must be considered. Is it inadequate? Is it being ignored? What needs to be changed to make it effective at preventing accidents and maintaining health at work?

The above is a checklist; not everything above may be applicable for a given accident. The more serious the incident, the greater the depth of investigation will probably be required. The main purpose of the investigation is to find all that can be learned to enable such accidents to be prevented in the future. The information gathered from this investigation will be used to improve the management of Health, Safety and Wellbeing in the Rowett.

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9. Fire safety precautions

Fire is probably the greatest single safety-related threat to the Rowett and its members. Even if everyone escapes safely from a building, important facilities and documents may be destroyed. We must therefore do all we can to prevent a fire starting and, should a fire start, be prepared to respond quickly and effectively to save life and property.

Fire prevention

Precautions that decrease the likelihood of fires starting include:

- In accordance with University policy, Rowett offices and laboratories are 'No Smoking' areas. No smoking is permitted at any time in University buildings.
- Comply with:
 - systems for inspection of electrical equipment;
 - procedures for storage/use of highly flammable liquids;
 - procedures for out-of-hours running of experiments; and
 - procedures for use of gas bunsen burners.
- Avoid accumulations of unnecessary materials that can easily burn (*e.g.* cardboard, paper)
- Do not obstruct the ventilation of electrical equipment or place material immediately above or close to electric heaters
- Do not overload electrical sockets or use multiple extension leads/adapters. Seek to get extra power sockets installed
- Do not trail electric leads over benches/floors in such a way that they might be caught, snagged or be a trip hazard.

On discovering a fire

If you discover a fire, take the following steps in the order given:

- 1) Sound the alarm;
- 2) Get someone to telephone the fire brigade (9-999);
- 3) Warn others (shout "**FIRE**" and bang on doors);
- 4) If you can do so without putting your own safety at risk and only if suitably trained attempt to fight the fire with a suitable extinguisher;
- 5) Otherwise, close the door to contain the fire, leave the building and await the fire brigade;
- 6) Do not use lifts

7) Go to the assembly point at the far end of the IMS carpark.

Extinguishers

Signs are posted throughout the University to indicate the applications for which the different types of extinguisher are suited and a sign above each extinguisher lists its use.

The applications are summarised below:



Colour of lettering:

cream

black

blue

Application	Foam	Carbon dioxide	Dry Powder
Wood, paper, textiles, etc.	✓		✓
Organic solvents, petrol, oil, fats, paints, etc.	✓	✓	✓
Fire associated with electrical hazards		✓	✓

Use of extinguishers:

- (1) Before starting to fight a fire (however small), ensure that the alarm is activated.
- (2) Extinguishers are only for dealing with small fires – if in any doubt, then withdraw, closing all windows and doors behind you.
- (3) Know which extinguishers can be used on the different types of fire.
- (4) Away from the fire, pull out the pin and do a brief test jet of the extinguisher.

- (5) Always position yourself on the side of the fire closest to a safe exit.
- (6) Only ever use one fire extinguisher, if you need to use two, then the fire is too big for you to fight
- (7) Do not use carbon dioxide extinguishers in small, closed cupboards and avoid holding the horn which will get very cold.
- (8) Do not use an extinguisher on a fire involving burning gas – turn off gas supply if it is safe to do so or leave for the fire brigade.
- (9) Do not use water on burning liquids or live electrical apparatus.
- (10) With electrical appliances, turn off the power supply before using extinguisher.
- (11) Normal foam is not effective on fires involving alcohols.
- (12) Special extinguishers are required for fires involving a burning metal. The type of extinguisher depends on the metal involved.
- (13) Fire blankets in laboratory areas can often be useful for fires to personal clothing. Lay the victim horizontal, to avoid the flames spreading up to the face. Wrap the blanket firmly around the affected area to completely smother the flames. Avoid setting fire to yourself by keeping behind the blanket.

All extinguishers are checked every 12 months (by a company contracted to the Estates Section). The date of last inspection is shown on the extinguisher.

If you hear the fire alarm:

- 1) designated floor checkers will check the rooms and laboratories, to ensure the occupants have heard the alarm and have left;
- 2) leave the building by the nearest designated fire exit and go to the assembly point shown on the fire notices;
- 3) anyone teaching or supervising groups of students should ensure that all students leave the building by the nearest exit and go to the assembly point;
- 4) if you are aware that someone might be still in the building, report to the person taking charge; and
- 5) do not re-enter the building until the fire alarm has been silenced. If necessary, call security (ext. 3939) to request attendance by an electrician to silence and reset the alarm.

Escape routes

- Corridors and escape routes must be kept clear. Combustible materials must not be stored in corridors or on escape routes.
- Furniture and other items must not be placed so they partially block escape routes.

- Fire doors inhibit the spread of fire and smoke. So, they must be kept closed and never wedged open. Any door fitted with a door-closing device should be treated as a fire door.

Floor checkers

Several people on each level of our buildings have been designated as 'floor checkers'. This simply means checking that labs and offices are empty as you leave the building. On no account should floor checkers jeopardise their own safety.

- Ensure as far as reasonably possible that persons have been evacuated from the office/laboratory area in which you are working
- Exit and assemble at designated point (see relevant yellow University "In the event of fire" notices)
- On leaving via the front door, report to the 'yellow jacket wearer' (attendant on duty) the extent of evacuation in your area of responsibility
- Take control of your assembly point in order to prevent re-entry until re-informed that it is safe to do so by the Fire Brigade. The cessation of the fire alarm should not be assumed as a signal for safe re-entry.
- Floor checkers should only assume this role when in their designated part of the building when the alarm sounds. **Do not attempt to go to other laboratory/office areas further away from your exit.** They should simply immediately leave the building by the nearest exit route, encouraging others to leave en route.

Liaison with the fire brigade

When the fire brigade arrive at a building containing laboratories, they need to be provided with information about the dangers they will face and their location. The person in charge wearing a yellow jacket will give this information.

Fire drills and alarm tests

Fire drills are held in all University buildings at least once each year to test the efficiency of fire evacuation arrangements.

The fire alarms are tested each week as follows (N.B. alarms sound twice in close succession):

Rowett building	Wednesday 9.00am
IMS building	Wednesday 11.25 a.m.
Polwarth building	Wednesday 11.00 a.m.

Staff in other University buildings should familiarise themselves with the times for fire alarm testing.

Personal evacuation plans

Any persons with disability or mobility issues coming to the Rowett should inform the Institute prior to arrival so that a personal evacuation plan (if required) can be discussed with the University Fire Safety Officer.

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10. Gas Alarms

All laboratories in the Rowett where compressed gases are used are fitted with gas sensors. This is to ensure safe working conditions for all who are present in these labs. If the gas concentration near the detector/s is outside the pre-set parameters the alarms will be activated. When a detector is activated the beacon will flash and an intermittent alarm will sound. The lab must be evacuated immediately. The parameters are set to allow early warning for safe evacuation of the areas.

The detectors have been fitted at different heights according to whether the gas being used is heavier or lighter than air. In most cases, labs will have more than one detector.

The labs fitted with gas detectors are identified by an orange beacon adjacent to the entrance door/s, there is a corresponding beacon inside the lab.

What to do if you are in a lab when the Gas Alarm sounds during normal working hours

If an alarm sounds in a lab you are in, leave the room immediately, once you are out of the lab check to see if the orange beacon is flashing to indicate it is a gas alarm, if it is a gas alarm you **DO NOT** need to evacuate the building, but you **MUST NOT** re-enter the lab where the alarm has been activated. The gas alarm system is connected to the University of Aberdeen security team at Dunbar Street. The Rowett Gas Alarm Response team will be alerted of the alarm being activated via the pager system or may already be aware of it due to the intermittent alarm and flashing light in their area.

A member of the gas response team will go to the Gas Alarm Panel on level 2 to ascertain which lab has had the alarm activated, they will then go to the lab and place the **NO ENTRY** signs on the door/s leading from the corridor (even if this is the door to an ante-room), they will then deal with the reason for why the alarm has gone off. The alarm sounders may be silenced while the reason for the alarm activating is investigated this **DOES NOT** mean the area is safe to enter. The **NO ENTRY** signs will remain on the doors and you **MUST NOT** enter the lab while the signs are displayed. Once the cause of the alarm is known and the area has returned to within the normal operating gas levels the signs will be removed and you will be allowed back into the lab.

If the alarm which is activated is for a flammable gas then the fire alarm will be activated at the same time and **EVERYONE** should evacuate the building and await instructions from the Fire Brigade.

Gas Alarm activation out-with normal working hours

If a gas alarm is activated out-with normal working hours then the above procedure of leaving the lab immediately should be followed, the University of Aberdeen security team at Dunbar Street will send a Foresterhill security guard to the Rowett to determine which room the alarm has been activated in. The guard will check the sign in book to check if anyone is working in the building, then they will go to the lab and check through the observation window if anyone is in the lab where the alarm has been activated. They will put the **NO ENTRY** sign on the door/s and acknowledge and silence the alarm, they **WILL NOT** investigate the cause of the alarm therefore there will be no access to the lab until it is checked by a member of the gas alarm response team the next working day. The **NO ENTRY** signs will be left on until the gas alarm response team are satisfied the cause for the alarm is resolved and the room is safe to enter.

If you come into the Rowett out-with working hours and find the **NO ENTRY** signs on the lab you are going to, you **MUST NOT** enter the lab as there may still be gas hazard in the room.

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11. First aid arrangements

The Rowett building operates a pager system for obtaining First Aid assistance. For emergency calls ring Ext 8686 state number and type of casualties, location and any obvious dangers involved. For non-emergency calls ring Reception on Ext 8701 state name and location of injured person. In either case the Receptionist will alert the first aiders and direct them to the casualty. Requesting First Aid notices are located by every telephone in the Rowett building. A list of qualified first aiders within the Rowett is available ([Appendix 3](#)). Local Rowett Safety Coordinators will ensure that:

- adequate numbers of qualified first aiders are present for staff and students in the Rowett
- qualified first aiders receive a refresher course within three years of their previous training
- adequate first aid materials are available throughout the Rowett and maintained in a satisfactory condition
- for eye-washing, eye wash stations can be found in all Rowett Laboratories, and in the emergency showers located on levels 2,4 & 5 of the Rowett building, irrigation should be carried out for 10-15 minutes.

Minor injuries

First aid boxes/cabinets are located in the corridors of each floor of the Rowett, IMS and Polwarth buildings, plus strategic locations throughout other areas. Staff and students must be aware of the nearest first aid supplies and how to contact a trained first aider. Even minor scratches should be washed thoroughly in cold running water before applying a plaster. The assistance of a first aider is important if you are injured

while working with substances that could cause harm if they enter the body through breaks in the skin.

First aid rooms

A first aid room with a bed and sink is located in the Rowett (room 2.043), IMS (room 1:56) and Ground Floor, Polwarth Building (room 0.004). This may be used for recovery after minor injuries. IMS room 1:56 may also be used for mothers breast-feeding and a fridge for their use only is provided.

Major injuries

An ambulance should be called immediately, by dialling 9-999. Indicate clearly which building you are in. Do not call for an ambulance via the University switchboard. Send someone to the front door of the building to direct the ambulance. A first aider can then be contacted to administer first aid to the casualty while waiting for the ambulance to arrive.

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12. Spillages

Despite precautions taken to avoid exposure to hazardous materials during normal use, unforeseen accidents may occur in which release of biological agents or chemicals occurs unexpectedly. An immediate response is required to:

- remove workers from the affected area;
- identify the nature and extent of the risks created by the spillage; and
- clean up the spillage.

In order to achieve this, staff from each laboratory need to ensure that:

- materials and protective clothing are available to clean up the spillage;
- suitable persons are involved in the cleaning up of spillages; and
- resultant waste is disposed of suitably.

Any students (PG or undergraduate) involved with a potentially dangerous spillage must evacuate the area immediately and contact their supervisor. The supervisor should assess the extent of the risk. Small spillages of bacteria can be cleaned up and disinfected without causing too much disruption. Spillage of small quantities of chemicals that give off toxic vapours, however, is likely to require a greater extent of evacuation and notification to the Spillage Response Team.

Response to spillages

- 1) If the spillage involves a hazard by breathing, immediately evacuate the affected room and the immediate vicinity or, if more serious, an entire room, corridor or building.

- 2) For less serious spills, evacuate the immediate area and prevent people from regaining access. For minor incidents, simply clearing the area near a bench may be sufficient, otherwise, for more serious incidents, complete evacuation of entire rooms, corridor or building may be necessary. Close doors leading to the area and clearly identify spill with a sign. Where necessary, use tape across door entrances to prevent unwanted entry.
- 3) Each laboratory should have access to a spillage kit, containing gloves, apron, absorbent pads, disinfectants, *etc.* for 2 people (assistance may be required). Emergency chemical spillage kits are located on levels 2, 4 and 5 of the Rowett building. Higher risk laboratories are also encouraged to supply their own.
- 5) Contact your supervisor/Principal Investigator or a Rowett Safety Coordinator for advice. For more serious incidents, the Spillage Response Team should be notified. Only those trained in the use of respiratory protective equipment should use it. Self-contained breathing apparatus (*i.e.* with cylinders of compressed air supplying a face mask) must only ever be used by authorised users who have undergone full training and, where necessary, refresher training. Two sets of breathing apparatus are available, one in the IMS first aid room (1:56) and the other in the Polwarth building first aid room (0.004). Both are maintained by one of the authorised users listed in the table below.

Authorised users of breathing apparatus (updated in November 2016):

Name	Location	Tel No.
Gary Cooper	Rowett	8654
Nick Hayward	Rowett	8758 / 8759
Claire Walker	IMS	7556
Linda Robertson	IMS	7341 / 7365 / 7429
Jonathan Pettitt	IMS	7516 / 7519
Richard Clark	IMS	7311

In the event of a spillage emergency:

- Evacuate the area and seal off access to the area.
- In office hours: contact one of the authorised users of the breathing apparatus (see Table above). Out-with office hours: contact Security (ext. 3939) Identify the location and the substances involved in the spillage. Let them decide whether the fire brigade need to be called.
- Complete an online accident investigation report for incident (see [section 8](#))

- 6) If the spillage can be cleaned up without any hazard to breathing, wear suitable protective clothing (safety goggles, gloves, laboratory coats, aprons, overshoes; see [procedure P.31](#)) from spillage kits in the lab/corridors. Work in pairs where necessary.
- 7) Dispose of hazardous waste in a suitable fashion (see [section 14](#)). Any waste contaminated by hazardous chemicals needs to be securely contained in bags or bins, and collected for incineration. Microbiologically contaminated waste needs to be fully disinfected or sterilised by autoclaving before disposal.
- 8) Emergency procedures following the release of living organisms are dealt with in [procedure P.19](#).
- 9) Complete an accident investigation report on the incident (see [section 8](#)).

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13. Inspection and maintenance of premises and equipment

Maintenance of equipment

Equipment in the Rowett requires periodic inspection and maintenance if it is not to become a source of danger to staff, students and members of the public.

Each School or laboratory must keep a list of major equipment in a folder kept for the purpose. This should list the following:

- Item, model number and serial number;
- Person responsible for ensuring maintenance of equipment;
- Details on frequency of inspection and/or service and who will do it;
- Inspection dates;
- Service dates; and
- Service reports (to be incorporated as they arise).

A responsible, named person, will:

- Determine the frequency of inspection and test for the different types of equipment in the Group's area;
- Ensure that inspection and test is carried out at the specified intervals;
- Ensure that electrical equipment is marked to indicate that it has been inspected or tested; and
- Maintain records of inspection and tests in a folder kept for this purpose.

Equipment will be examined at each safety inspection to ensure that inspections and services are kept up to date and that the person responsible for ensuring these checks are done is still in charge.

Equipment requiring periodic maintenance/replacement include: centrifuges, copiers, electrical equipment, fume cupboards, microbiological safety cabinets, gas cylinder regulators, etc. Some of these may be tested/serviced by external contractors. Nevertheless, it is necessary to maintain all test certificates since the Rowett retains responsibility for ensuring that maintenance is undertaken on all of its equipment.

Maintenance of premises

The maintenance of University premises is the function of Estates. Any member of staff noticing any part of the premises that give concern, with respect to Health, Safety and Wellbeing, should place a warning sign, if necessary, and contact Estates through the fault desk (ext. 3333). Under no circumstances must any work that affects the fabric of the buildings be undertaken unless arranged by Estates. The purpose of this prohibition is to prevent asbestos-containing materials being disturbed (<https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#asbestos>)

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14. Good laboratory practice

The following practices should be instinctive to all who work in laboratory areas. Everyone should be encouraged to ensure that they follow the practices to make the laboratory a safer place for everyone. Several of these practices are dealt with in more detail elsewhere in the Handbook.

- Do not use unfamiliar equipment without reading the instructions and safety procedures. Ask an experienced operator to demonstrate its use.
- Turn off all gas, water and electric supplies when no longer required.
- Keep benches, shelves and floors clean and tidy at all times.
- Keep corridors, fire exits and entrances clear of obstruction.
- Any spillages and breakages must be cleaned up immediately.
- All containers must be clearly labelled with their contents and, where possible, marked with the appropriate hazard-warning symbol.
- Wash bottles containing any liquid must also be clearly labelled.
- Do not set up apparatus in front of service controls, fume cupboards, fridge doors or exits.
- Sinks are intended for washing up and disposing of suitable liquid waste to the drainage system, not hand washing. Keep the area clean when not in use. Do not leave glassware sitting in sink.
- Contaminated glassware should be soaked and/or rinsed thoroughly with water or solvent to remove chemical contaminants before thorough washing. Biologically

contaminated glassware must be adequately disinfected before washing, ensuring that all areas of glassware are submersed in disinfectant.

- Labs using biohazardous material must have effective disinfectants available for immediate use in the event of spillage.
- Balances weighing chemicals should be kept clean at all times. Spillages must be cleaned up immediately; other workers will not know the nature and safety precautions needed to clean up your spillage.
- Take care if you have to access elevated areas/storage. Do not climb over apparatus and always use kickstool or steps. Avoid storing items on high shelves above people's workbench.
- Do not place volatile toxic materials in lifts or cold rooms.
- When heating liquids, beware of bumping: add boiling beads before heating is started.
- Lone working (see procedure [P.23 Lone working and out of hours working](#)): avoid working alone with hazardous apparatus and chemicals, and always if a procedure is new and un-practiced.
- Fire (for details see section 9, [Fire safety precautions](#)). You must know:
 - the fire escape routes from your place(s) of work
 - the sound of the alarm
 - the types, location and method of use for the different types of extinguisher.
 - the location of the break glass fire alarm call points
 - the location of the first aid boxes
 - how to call for emergency help (9-999).
- Accidents. Report all accidents and near misses to your supervisor, who is the person who must complete the online accident report form (see section 8: '[Accident investigation and reporting](#)').
- Visitors should be kept away from laboratories whenever possible.
- Children in the Rowett must always be accompanied and adequately supervised at all times. Entry to laboratory areas should be restricted to those over 14 years and they should use the same protective clothing required of adults in laboratories.
- Mouth pipetting (even of harmless substances) is prohibited.
- All procedures must be performed so as to minimise the production of aerosols.
- Eating, drinking and food/drink storage in laboratory areas are prohibited. The only exception is where specifically authorised for human physiology/exercise experiments, and then only in clearly designated areas.
- Applying cosmetics and putting pens/pencils in mouth is not permitted.

- Howie style laboratory coats must be worn and fastened at all times in laboratory areas. They should be removed when **leaving** laboratory areas, unless in transit to another laboratory area.
- Laboratory coats are never allowed in the Rowett atrium.
- Laboratory coats should be cleaned at regular intervals. Dirty lab coats, labelled with name, building and room number should be put into the black bin in IMS wash-up for cleaning. Ensure that all pockets are emptied. Syringe needles or razor blades must never be put in pockets at any time. If contaminated with biological agents, coats must be placed in autoclave bags and autoclaved before washing.
- Wash your hands thoroughly after handling hazardous substances and when you leave the laboratory.
- The laboratory door should be closed while work is in progress.
- When wearing protective gloves, do not touch anything that someone else might touch without gloves (*e.g.* telephone, computer keyboard, door handles).
- Mobile phones are discouraged from laboratories to avoid handling them with contaminated protective gloves. Should hand-held devices be used for laboratory work (such as photography) and where the use of protective gloves is required, then phones should be enclosed in a plastic bag or cellophane and the covering left in the laboratory on leaving.

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15. Waste and its disposal

We have a duty to ensure that hazardous waste **does not harm anyone likely to handle it**. This includes those who:

- handle it between the point where it is generated and the point of ultimate disposal (e.g. cleaners, porters, waste disposal contractors);
- come into contact with the waste at its point of ultimate disposal (e.g. chemicals mistakenly sent to a landfill site for domestic waste. This could harm workers at the site, or children/families who might play or live near the site).

We separate waste into different streams at the point of generation. Each **waste stream** is stored separately and follows separate routes. Everyone in the Rowett must:

- Be aware of the specific waste streams in the Rowett and Foresterhill site;
- Ensure they know which waste goes into which stream (see below); and
- Know where to place waste for each of the waste streams.

Staff must ensure that waste is removed promptly and not allowed to accumulate.

Waste Streams

A. Solid waste

General non-toxic domestic waste e.g. paper, dry mixed recyclates foods

- Are collected in **recycling bins**; cardboard flattened for recycling
- Must not be contaminated (e.g. no plastic with food)
- Only mixed non-hazardous waste goes into **black** bags
- it is disposed of in land fill sites
- cleaners will take this waste away

Confidential waste

- confidential paper waste goes into **white** bags or locked consoles
- Consoles will be emptied by external contractors.

Equipment, metals and strip light bulbs

- Metal should **not** be disposed of in autoclave bags or orange bags
- For large pieces of metal & old equipment, removal needs to be arranged by Estates
- Estates will arrange for removal and safe disposal of spent bulbs.

Clinical and biohazardous waste

- waste goes into **yellow** bags - these should be tagged with cable ties available FOC from IMS stores
- it will get heat sterilised and disposed of in land fill sites
- infected material or tissue culture waste must not be disposed of in yellow bags (see below)
- waste should be placed in the containers outside IMS back door (key available from IMS stores).

Infected waste/cultures

- waste goes into **clear** 'autoclave' bags;
- labelled with building and lab number;
- it is autoclaved; and
- it will then be treated as yellow bag waste

GMM waste

- Genetically modified microorganisms (GMMs) must first be inactivated according to **approved** procedures before disposing in appropriate waste stream (see procedure [P.19 Genetic modification work](#)).

Human tissue waste

- Place human tissue and waste from 'highly infectious' cases in **170 gauge yellow bags**. Place in 300 gauge yellow bag in deep freeze. When outer bag is 50% full, seal with ratchet seal and await uplift.
- Contact Chris Osbeck, Waste and Environmental Manager [2053] if you have any problems.

Solid radioactive waste

- Radioactive waste goes into **white plastic** bags, which are then placed in the metal dustbin in Lab 4.030. Disposal must be recorded on the Isoinventory and the bag will require a specific label from the RPS before it can be put out (see Ionising Radiation Safety Arrangements and Rowett Local Rules for Ionising Radiation; both at <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#ionising-radiation>).

Sharps with or without minor human blood contamination

- sharps *e.g.* needles, small amounts of broken glass, blood tubes, slides, *etc.* should go in sharps bins (yellow with yellow lids)
- Lids should be put securely on containers while empty and before use and the label filled out. Never attempt to remove lids
- once full to the limit indicated on the container, the bin should be sealed, tagged and labelled with lab number (*e.g.* Rowett 5.019)

- Full bins should be put into the “sharps” yellow wheelie bin in the bunker between IMS and Polwarth (key in IMS stores), they will then be sent for incineration
- larger quantities of blood should be placed in clear bags for autoclaving, preferably double-bagged to ensure blood cannot leak out.

Ethidium bromide waste

- should go in ‘Cytotoxic Bins’ (yellow with purple lids)
- they should be sealed, tagged and labelled with lab number (*e.g.* Rowett 5.019)
- these should then be placed in the yellow wheelie bin in the bunker outside the IMS. The key is held in IMS stores.
- Use of alternative less toxic dyes should be considered instead of ethidium bromide.

Broken glass

- uncontaminated broken glass too big for sharps bins should be placed in puncture-proof container. Full containers should be sealed and labelled as broken glass and taken to the porter’s desk in the Polwarth Building.
- contaminated broken glass should be placed in a suitable container *i.e.* a plastic box which can be autoclaved, then placed in a clear bag and taken for autoclaving

B. Liquid waste

Many chemicals can be safely disposed of down drains flushed with plenty of water. Forbidden materials include:

- Water-immiscible solvents – see solvent waste below
- Chemicals which can produce inflammable/explosive vapours in drains
- Chemicals which can produce explosive deposits in drains (*e.g.* azides, acetylides, silver salts)
- Substances that might block drains, or cause injury to drainage workers (*e.g.* cyanide, large quantities of antibiotics).
- Formaldehyde-containing solutions.
- Chemicals that are known to be dangerous to the aquatic environment. Check MSD for disposal guidelines.

Disposal of waste not suitable for discharge into drains

- Disposal of chemicals must be planned before purchase.

- Significant quantities of unwanted chemicals should not be allowed to accumulate.
- If you have unwanted chemicals that cannot be discharged to the drains, contact a Rowett Safety Coordinator for advice.
- Where possible, dangerous wastes should be rendered innocuous by suitable chemical treatment.

Solvent waste

- Each laboratory should have two bottles, both clearly labelled, for water immiscible, solvent waste: (a) non-halogenated solvents; (b) halogenated solvents.
- These must be stored in a solvent cabinet and should be labelled to indicate the proportions of individual solvents and whether any hazardous chemicals are dissolved in the solvent.
- For disposal, contact Louise Cantlay (8615), who will arrange to store them in the solvent store and liaise with IMS for removal from the site.

Biological and radioactive liquid waste

- All liquid microbiological cultures must be treated with disinfectant for suitable periods to kill the organism concerned.
- Disposal of radioactive waste to drain must be down designated sinks only and must be recorded on the Isoinventory (see Ionising Radiation Safety Arrangements and IMS Local Rules for Ionising Radiation; both at <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#ionising-radiation>).

Chemical Waste Disposal

- Waste should be separated into 3 categories:
 - organic solvent waste – non- halogenated
 - halogenated solvent waste
 - other chemical waste, including formaldehyde-containing liquids
- Fill in the [chemical waste disposal form](#) and send to Louise Cantlay, who will arrange disposal.
- If you have a large amount of chemicals, email Louise Cantlay to obtain crates to put the chemicals in – then prepare a list, using chemical waste disposal form for each crate detailing what you have put in each. Email this list to Louise Cantlay and proceed as above.

- **What not to put into Solvent Store:**

- Yellow cytotoxic or sharps bins (there are bins in a cage outside the IMS for depositing these)
- Anything you suspect might contain radioactive substances (these are disposed of with radioactive waste but please inform the RPS if they also contain hazardous chemicals).
- Any leaking containers (these must be made safe by placing inside a container which contains absorbent granules to mop up the leaks. The container should have a lid and should be clearly labelled with the contents).

Miscellaneous waste

Used batteries, empty aerosol cans and used deuterium, tungsten & mercury arc lamps can be disposed of in the same way as chemicals. IT equipment, waste electrical and electronic equipment (WEEE) should be returned to IT, or stored for disposal at bi-annual WEEE collections.

Waste stream for Rowett/IMS at Foresterhill site

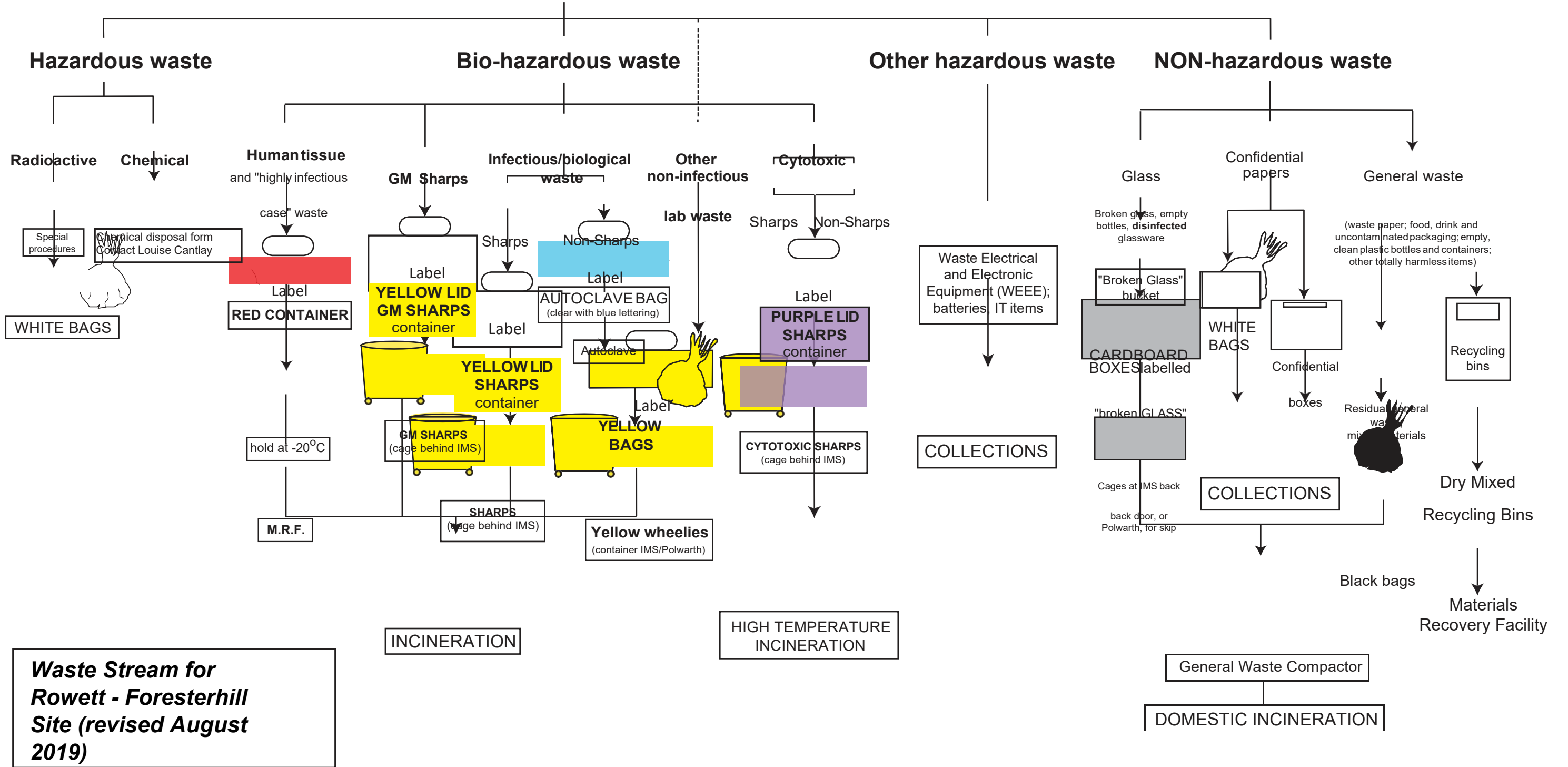
The disposal system for waste at Foresterhill is summarised in a flow chart on the following page. A copy can be found in the Rowett Safety Summary that should be located in each laboratory. Always ensure that waste enters the correct stream to protect people from hazardous waste. Conversely, general non-hazardous rubbish should not be put in with hazardous waste as this encourages others to disregard proper waste disposal procedures and adds to the unnecessary cost for the disposal of waste. Do not allow waste to accumulate.

SUMMARY OF COLOUR CODE FOR WASTE:

RECYCLING bins	Separate bins for dry mixed recyclates and food
BLACK bags	Residual general waste (mixed materials)
WHITE bags	Confidential waste
YELLOW bags	Non-infectious laboratory waste
CLEAR bags	Autoclavable waste
WHITE bags	Radioactive waste
YELLOW bags	Human tissue waste
YELLOW bins	Cytotoxic waste (PURPLE LIDS)
YELLOW bins	ALL sharps (YELLOW LIDS)

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TYPE OF WASTE



Waste Stream for Rowett - Foresterhill Site (revised August 2019)



16. Procedures for specific hazards

P.1 Access to the Rowett

Access to the various Rowett buildings is restricted to authorised staff and students carrying University ID cards. Cards must be carried at all times.

Entry out of hours to the Rowett building is through the door to the left of main entrance and you should sign the sheet at the Reception on entry and departure and phone university security on 3327 or check in using the SafeZone App.

Staff should check the access procedures for other buildings within the University.

Working outwith hours poses the additional risks associated with working alone (see procedure [P.23 – ‘Lone working’](#)). Wherever possible this should be avoided. All electrical equipment being run out with normal hours should be accompanied with a form (see procedure [P.30 – ‘Out of hours running of unattended experiments’](#)).

Valuables should never be left unattended in unlocked places throughout the University.

Visitors, children and pets

- All visitors must be signed into the Rowett building, this includes family members and children.
- Visitors should be kept away from laboratories whenever possible.
- Research subjects should not be left unattended where there is any likelihood that they can walk into laboratories or other prohibited areas.
- If entering laboratory areas, visitors should be made aware of potential risks. They should not be left unaccompanied.
- Children should not go into laboratory areas.
- Children brought onto University premises must be accompanied and adequately supervised by a responsible adult at all times. Safety rules for laboratories apply to both adults and children (*e.g.* rules on the wearing of personal protective equipment) and they should only be allowed into laboratories after a full risk assessment. Children should never be left in circumstances where they could wander away from adults and find themselves in a hazardous area. Adults who are accompanying children should not engage in activities which would interfere with their ability to provide adequate supervision.
- Pets are not allowed in any Rowett areas.

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P.2 Access to heights

Storage above head height

It is particularly important in a laboratory, where the consequences of a fall can be severe, that a suitable means of access is used to reach storage above head height. Access to storage above head height should only be by stepladder or a kick stool. “Unsuitable access” includes chairs or tables. A ladder is available in IMS stores and in various labs within IMS. Ladders must be inspected every 6 months to ensure they are safe and a record of inspections kept next to the step ladder. Chairs, and particularly swivel chairs, must never be used. Every attempt should be made to minimise the extent of storage above head height. See separate procedure (procedure P.11 “[Chemical safety](#)”) for guidelines on storage of hazardous chemicals.

Work at heights

It is not normally deemed suitable for anyone in the Rowett to work in a place where they could fall more than 2 metres. Should anyone be required to do so, they must discuss the matter first with their Supervisor or Local Safety Coordinator.

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P.3 Driving on University business

Guidance on Driving on University Business has been prepared at the request of the University Health, Safety and Wellbeing Committee. A copy of the guidance can be found at: <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#driving-and-vehicles>

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P.4 Autoclaves and pressure cookers

Autoclaves are used in the Rowett for sterilisation of infected material and for the sterilisation of materials for use in the laboratory. The main autoclaves are located in the IMS building room 1:21 and are maintained and operated by staff in the IMS building. Only authorised people trained in their use may operate autoclaves.

Bags of infected material for autoclaving should be sealed with a ratchet clasp and labelled with name and room number. They should be left in the basket in IMS room 1:21. Medium and glassware for sterilisation, labelled with name and room number on autoclave tape, should be left on the trolley next to the autoclave. The caps must be loosened on any bottles; remember that they will tend to tighten under pressure during autoclaving. They should be collected from the shelves opposite the autoclave.

The major hazards associated with autoclaves are:

- explosive breakage of vessels placed in the autoclave while they are being unloaded from the autoclave or are subsequently being opened;
- scalds resulting from careless handling of vessels containing boiling liquids;
- scalds from steam issuing from autoclave;
- burns from physical contact with the autoclave; and
- failure of component parts of the autoclave while under pressure.

Pressure cookers (bench-top autoclaves) may be used in laboratory areas. These must be suitable for laboratory use and operated according to manufacturer's instructions. Most of the hazards that apply to autoclaves will apply to the use of such pressure cookers. (When operating microwave ovens, it is also important to note that bottles must have their caps loosened – see procedure [P.26 Microwave ovens](#)). Heat-resistant gloves must be used when handling hot items. Allow adequate time for cooling before opening pressure cookers. Likewise allow bottles to cool before they are opened.

Inspection and maintenance of autoclaves

1. Regular bench-top autoclave maintenance and servicing is organised by the Rowett TRM who will notify the person responsible.
2. The person who is responsible for the room these bench top autoclaves are located is responsible for ensuring the regular inspection and maintenance. A register of all autoclaves in the Rowett is retained in Q-pulse to ensure that they are regularly inspected and maintained in accordance with manufacturers' recommendations.
3. There are specific statutory requirements covering the inspection of pressure systems. A written scheme of examination must be prepared for all such systems stating what must be inspected, the nature of the inspection and the frequency

of inspection. An insurance company contracted by Estates Section will prepare the written scheme of examination and carry out the periodic inspection.

The Rowett TRM along with the person responsible for the autoclave should ensure that, where required,

- a written scheme of examination has been prepared for each autoclave
- the required inspections are carried out at the specified intervals
- copies of the written schemes are kept on file along with inspection certificates from each inspection.
- each autoclave requiring inspection is marked with the date of last inspection and the date when the next inspection is due.

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P.5 Biological safety

This section applies to any work with a “biological agent” and to *unscreened human blood and tissues that may contain biological agents*. A “biological agent” is defined as *any microorganism, cell culture or human endoparasite which may cause infection, allergy, toxicity or otherwise create may create a hazard to human health*.

Those in control of work with biological agents must:

- determine the hazard group for the biological agent (there are four hazard groups 1-4 – see below and “**The approved list of biological agents**” links);
- determine the containment level required (there are four containment levels 1-4 – see links below); and
- Implement the requirements of the appropriate containment level and, for work at containment level 2 or above, produce “local rules” to be followed by those who will be involved in the work.

Those in control of work with biological agents must have ready access to the book entitled, “[The Management, Design and Operation of Microbiological Containment Laboratories](#)” (2001) HSE Books, ISBN 0-7176-2034-4, [free to download]. They should also have [Biological agents: Managing the risks in laboratories and healthcare premises – HSE 2005](#). The Advisory Committee on Dangerous Pathogens, the official body that oversees work with infectious material throughout the UK, produces a book called, “**The approved list of biological agents**”, which is available at <http://www.hse.gov.uk/pubns/misc208.pdf>. This gives information of the classification of various biological agents.

The HSE have published guidance on working in clinical laboratories. As well as being relevant to work in hospital laboratories, it provides guidance on safe working practices, which will be of use in all University laboratories where biological material with a risk of human infection is handled. Each Group should have a copy – it is, “[Safe working and the Prevention of infection in clinical laboratories and similar facilities](#)”; [Health, Safety and Wellbeing Executive, 2003, ISBN 0717625133](#).

Biological Agent Hazard Groups

Biological agents are categorised into four hazard groups based on the risk of infection: Group 1 agents create the least risk of infection; Group 4, the highest risk.

Group 1 *Unlikely to cause human disease; e.g. Aspergillus niger, Cyanobacter spp.*

Group 2 *Can cause human disease and may be a hazard to laboratory workers; it is unlikely to spread to the community and there is usually effective prophylaxis or treatment available; e.g. Vibrio cholerae, Listeria monocytogenes.*

Group 3 *Can cause severe human disease and may be a serious hazard to laboratory workers; it may spread to the community, but there is usually effective prophylaxis or treatment available; e.g. Yersinia pestis, Histoplasma spp, Hepatitis B virus, Human retrovirus, polio virus and verotoxigenic Escherichia coli strains.*

Group 4 Causes severe human disease and is a serious hazard to laboratory workers; it is likely to spread to the community and there is usually no effective prophylaxis or treatment available, e.g. Lassa, Marburg and Ebola viruses.

The Health, Safety and Wellbeing Executive have produced a list of the common biological agents assigned to Hazard Groups 2, 3, and 4. The list is called the “**Approved List**” (which places micro-organisms in their respective Hazard Groups from which the level of containment is then determined). The current list (2004) is available as a PDF document at <http://www.hse.gov.uk/pubns/misc208.pdf>.

It should not be assumed that an unlisted agent is automatically in Group 1 if it is not listed in the higher groups. Those working with the agent are responsible for placing it in the correct group on the basis of the criteria specified for each group.

Having determined the hazard group for a biological agent, the next step is to determine the level of laboratory containment that must be adopted when working with the agent. **Unscreened blood/tissue (i.e. where a hazard group classification cannot be made) should be treated as for hazard group 2.**

Laboratory containment level

The term “containment” is used in describing safe methods for managing biological agents in the laboratory where they are being handled or stored. The purpose of containment is to control the exposure of laboratory workers and others to potentially infectious material.

Containment involves:

- configuring the laboratory in a suitable manner
- providing suitable equipment
- ensuring appropriate working practices.

The greater the risk of infection from the biological agent, the stricter the standards of containment need to be. Health, Safety and Wellbeing legislation defines four levels of containment (levels 1-4). It is a legal requirement that work with a biological agent be carried out at the containment level corresponding to the hazard group

(i.e. CONTAINMENT LEVEL 1: for hazard group 1 biological agents

CONTAINMENT LEVEL 2: for hazard group 2 biological agents

CONTAINMENT LEVEL 3: for hazard group 3 biological agents

CONTAINMENT LEVEL 4: for hazard group 4 biological agents).

Note: There are no containment level 3 areas within the Rowett building. In the IMS only very restricted areas are certified for containment level 3 work. All users in these facilities must be authorised and familiar with procedures before working. Anyone requiring to use these facilities in IMS should first consult with David McKenzie. There are no facilities for containment level 4 in the University.

Requirements of CONTAINMENT LEVEL 1

Containment level 1 is required for work with Group 1 biological agents. Group 1 agents are defined as being those “unlikely to cause human disease”.

Containment level 1 represents the basic level of containment and represents what many refer to as “Good Microbiological Practice”. All of the precautions at containment level 1 should be second nature to anyone working with any material of biological origin.

Building/physical measures

- 1) Good hygiene should be maintained and this is aided if the laboratory is easy to clean, particularly the bench surfaces. These should be impervious to water and resistant to acids, alkalis, solvents and disinfectants that may be expected in normal use.
- 2) The laboratory should contain a basin or sink that can be used for hand washing.

Work practices

- 3) Laboratory coats should be worn in the laboratory and removed when leaving the laboratory suite. They may be side-fastening lab coats.
- 4) Effective disinfectants should be available for immediate use in the event of spillage.
- 5) Eating, chewing, drinking, taking medication, smoking, storing food and applying cosmetics in the laboratory are forbidden.
- 6) Mouth pipetting is forbidden.
- 7) All procedures should be performed so as to minimise the production of aerosols.
- 8) Hands should be washed as soon as contamination is suspected and before leaving the laboratory.
- 9) Bench tops and laboratory equipment should be disinfected after use.
- 10) Used laboratory glassware and other materials awaiting disinfection should be stored in a safe manner. Pipettes should be totally immersed in disinfectant.
- 11) Contaminated materials whether for recycling or disposal, should be stored and transported in robust leak-proof containers without spillage.
- 12) All waste material, if not to be incinerated, should be disposed of safely by other appropriate means (see section 14 – [‘Waste and its disposal’](#)).
- 13) Accidents and incidents should be immediately reported to and recorded by the person controlling the work.

Requirements of CONTAINMENT LEVEL 2

Containment level 2 must be used for work with Group 2 biological agents and unscreened human blood/tissue. Containment level 2 differs from containment level 1 in the following ways:

- those working in the laboratory must receive specific training in the hazards associated with the agents used and the precautions required
- a high standard of supervision of the work must be maintained
- local rules should be prepared detailing the procedures to be followed in the laboratory
- there must be specified procedures for disinfection
- access to the laboratory must be restricted while work is in progress
- the door to the laboratory should be kept closed while work is in progress
- there must be designated safe storage facilities for biological agents
- there are restrictions on the types of ventilation permitted in the laboratory
- a microbiological safety cabinet must be used for procedures which give rise to infectious aerosols
- side or back fastening gowns (rather than front-fastening lab coats) must be worn
- wash basins must have taps of the type that can be operated without being touched by hand
- an autoclave for sterilisation of waste must be available in the same building.

Containment level 2 - generic local laboratory rules

These are generic local rules which can be used to produce local rules specific to a particular laboratory. These generic rules are not a substitute for laboratory-specific local rules.

Personnel working in a containment level 2 laboratory must receive specific training in the hazards associated with the agents used and the precautions required. A high standard of supervision of the work must be maintained.

- The biohazard symbol and the level of containment should be displayed at the entrance to the laboratory.
- ONLY authorised personnel should have access to the laboratory. The laboratory door should be kept closed whenever work is in progress. Casual visitors to the laboratory are not permitted.
- There must be NO eating, chewing, drinking or storing of food in the laboratory.

- All personnel in the laboratory MUST wear a lab coat at all times. Side fastening Howie-style laboratory coats are compulsory in containment level 2 laboratories, but front fastening ones are acceptable in containment level 1 laboratories. Coats MUST always be fastened.
- NO bags, outdoor clothing, *etc.* should be in the laboratory.
- Gloves MUST be worn when handling blood, faecal samples or tissue. Gloves should be removed before handling items likely to be touched by those not wearing gloves (such as telephones, paperwork, door handles, light switches). If samples are taken to another laboratory, at least one glove must be removed. The ungloved hand is then used to open doors *en route*.
- Cuts, scrapes, *etc.* on exposed skin should be covered with waterproof dressings.
- All work using human blood, faecal samples and tissue MUST be carried out on sealed benches or in spillage trays.
- Benches should be kept clear of paperwork, *etc.*, and underbench areas should be clear of boxes; where storage cannot be avoided plastic boxes should be used if the internal contents of cardboard boxes are not protected by plastic.
- A microbiological safety cabinet or similar must be used when carrying out procedures that could result in infectious aerosols.
- The use of sharps and glassware should be avoided as much as possible. To avoid needlestick injury, do not re-sheath needles or replace needles on a syringe.
- In the event of a needlestick injury, if the needle is clean and unused, no further action is necessary. If the needle is contaminated with potentially infective material, bleeding should be encouraged and medical attention should be sought from the Accident and Emergency Department at the Hospital. An online accident report form must be completed by the supervisor.
- Samples carried to other laboratories must be placed in suitable containers, that will ideally contain any spillage if dropped. Consult appropriate regulations/ local Safety Coordinator if transport of samples is required.
- Blood, tissue, faecal samples and derived products must be stored safely when work is not in progress.
- Bench surfaces and any equipment used should be disinfected immediately when work is finished with a chlorine-based disinfectant such as Presept, Haz Tabs or ChemGene. At the end of the working day there should be no biological material left out on benches, *etc.* which could pose a hazard to cleaning and security staff.
- Waste segregation procedures must be followed. Blood and tissue samples should be re-capped and disposed of by placing into autoclave bags and then autoclaved. Large quantities of blood and products (*e.g.* washing medium from cell isolation procedures), can be treated overnight with at least a half volume of disinfectant such as Presept or ChemGene, and then disposed of down the sink.

Used needles should never be re-sheathed, and should be disposed of in Cin-bins immediately.

- Spillages of blood, *etc.* should be treated with the Biological Hazard spillage kit provided in the laboratory. Make sure you know where this kit is, and how to use it. The recommended procedure is to blot spillage with absorbent material and flood with a freshly made solution of disinfectant.
- Individuals should inform their PI if they are undergoing any treatment that affects their normal resistance to infection (e.g., HIV infection, prescription of antibacterial antibiotics or steroids). Alternatively, they should consult with Occupational Health.

Containment level 2 allows work with unscreened blood, faecal samples and tissue only. You cannot work with samples KNOWN to be, for example, Hepatitis B or HIV positive. HIV has been detected in blood and blood products, in serum, plasma, breast milk, semen, vaginal and cervical secretions, urine, tears, peritoneal fluid, pleural fluid, pericardial fluid, synovial fluid, amniotic fluid, saliva, faecal samples and both CSF and brain tissue. Possible HIV contamination should therefore be considered when handling materials of these types in the laboratory.

Containment level 2 – Human sample management

- All studies involving human volunteers and/or human samples must be approved by the Human Studies Management Committee, and also given ethical approval, in accordance with SOP HNU002. Any SOP's or methods to be used in such studies should have appropriate risk assessments performed prior to commencement.
- All staff and students involved in a study that uses human samples should have met with the Biological Safety Adviser (BSA, Dr Karen Scott) *before* starting the study. A sample registration form (DAA 37), available on Q-pulse, must be filled in for each separate study.
- All human samples collected within the Rowett *and* samples brought into the Rowett from elsewhere eg bloods, urine, faeces and tissue samples require to be registered.

Containment level 3

There are no containment level 3 facilities within the Rowett building but there are containment level 3 facilities in the IMS building. If work requires containment level 3 facilities, this must be first discussed with the Director of the Rowett, the Biological Safety Adviser and procedures put in place before any work is undertaken.

Handling of human tissues, blood, faecal samples and other secretions

Under no circumstances should any worker use their own blood, or that from anyone else associated with the work, in order to culture or transform cells. The use of another person's cells is vital so that an immune response can be raised against them should they be inadvertently reintroduced to the worker. The use of a worker's own blood will prevent this immune reaction with the result that potentially transformed cells will not be cleared from the body. The donor of the blood should not enter the room where culture of their blood is taking place.

Work with blood, faecal samples and tissue must be carried out as follows:

Containment level 2, the requirements of which have been described above, must be used for work with unscreened human blood/tissue and faecal samples. Unscreened human blood may be infected with blood borne biological agents such as HBV (hepatitis B virus) and HIV (human immunodeficiency virus). Unscreened faecal samples may be infected with hepatitis A virus and other biological agents. All human tissue or body fluids could potentially be contaminated with blood or contain viral agents and therefore will present similar risks to unscreened blood. The following additional precautions should also be adopted:

- use a microbiological safety cabinet or other form of primary containment when infected material may be dispersed, for example by tissue homogenisation, or vigorous mixing;
- keep the designated working area clear of any unnecessary equipment;
- wear gloves and other personal protective equipment appropriate to the task, including eye protection;
- cover cuts, grazes and broken skin on exposed skin with waterproof dressings;
- avoid using sharps and glassware; and
- clean and disinfect bench surfaces and any equipment immediately on completing a work session.

It is strongly recommended that personnel working with unscreened blood or tissue are vaccinated against Hepatitis B (see below). In the same way personnel working with unscreened faecal samples should be vaccinated against Hepatitis A.

Any work with material known or strongly suspected to be infected with HAV, HBV or HIV must be carried out at containment level 3, since these viruses are all Hazard Group 3 biological agents.

If blood, faecal samples or tissue is known to be positive for a biological agent other than HAV, HBV or HIV, precautions appropriate for that agent must also be taken.

Precautions for work with human and animal transmissible spongiform encephalopathies (the prion diseases, including BSE and CJD) are given in "**Transmissible Spongiform Encephalopathy Agents: Safe Working and the Prevention of Infection**", HSE Books, 1998, ISBN 0-11-322166-5.

Taking blood specimens

- 1) Only those who have been properly trained in phlebotomy and who have received written authorisation from the Director of the Rowett should take blood. A register of authorised phlebotomists is maintained by HNU Manager.
- 2) Prospective donors of blood should be recruited on the basis of informed consent and good ethical principles and should not be pressurised to volunteer. There are many reasons why a person may not wish to participate.

One reason for this approach is to discourage people who may be in groups with a high risk of infection with blood borne viruses from donating without drawing attention to them, as there are other valid reasons for declining to participate.

If there any doubts about the advisability of giving blood, prospective volunteers may discuss their concerns, in complete confidence, with a doctor or a nurse in the University's Occupational Health Service.

- 3) The authorised person taking it must maintain a record of the volumes of blood taken on the phlebotomy form (Form 304). These forms will be maintained centrally in the HNU office 3.003.
- 4) Blood should only be taken in the designated phlebotomy rooms in the HNU Level 3.
- 5) Ideally a second person should be available in case help is required, *e.g.* in the case of a volunteer fainting.
- 6) Impervious worktops and hand washing facilities should be available. The room should be easy to decontaminate after a spillage. Material to clear up a spillage and to decontaminate the parts of the room affected should be readily available.
- 7) The authorised person taking blood should wear scrubs or appropriate PPE and gloves.
- 8) Human blood, even if from apparently healthy individuals, should be treated as potentially infectious and should be handled with at least Laboratory Containment Level 2 – *i.e.* use higher containment if risk assessment indicates it is required.
- 9) Those taking blood or handling unscreened blood should, where feasible, have been vaccinated for hepatitis B.

Needlestick injury

Needlestick injuries are a common problem in laboratories and the most likely route of transmission of infection. Should a needlestick injury occur, the following guidelines should be followed:

- 1) If the needle is clean and unused, all that is necessary is to encourage bleeding of the wound.
- 2) If the needle has been used and has come into contact with potentially infectious or radioactive material, bleeding should be encouraged and medical attention sought at the Accident and Emergency Department at the Hospital, with any follow up treatment carried out by booking an appointment with occupational health via HR.
- 3) The incident should be reported immediately by the supervisor using the online accident report form <https://www.abdn.ac.uk/staffnet/working-here/health-and-safety-308.php> .
- 4) To reduce risk of needle stick injuries, never attempt to re-sheath or remove a needle from a syringe.

Immunisation/vaccination

All persons working with human samples of any kind must see the biological safety adviser *before* any work commences.

Two types of vaccinations, Hep A or Hep B, may be advised/offered depending on the nature of the samples to be studied. Both are courses of injections (Hep A, 2 injections, the first on day 1, the second 6 to 12 months later; Hep B, 6 month course of 3 injections followed by a blood sample at 9 months for antibody titre). Neither vaccination confers immediate immunity but will give a 'degree of cover' after the first injection, ie if the injection is going to work at all, there will be some cover straight away. Remember, since there may be other viruses present in human samples vaccination is no substitute for safe working practices. Training must be given before work with human samples.

Where graduate/honours student projects involve work with human samples the same process should be followed. The course of injections may be longer than the duration of the student's placement but it is likely that 'degree of cover' will be given from the first injection. Again it must be highlighted that vaccination is *not* a substitute for safe working practices. All processes should be risk assessed prior to any work being carried out, and high risk activities should be avoided by a newly vaccinated person.

It is also essential that any accidents (e.g. cuts and other puncture wounds) that could have led to possible exposure to a blood-borne virus are reported immediately to a first aider, who will be aware of the importance of applying the correct treatment and getting advice from OHS. If appropriate, OHS will recommend post- exposure prophylaxis.

New staff/students/or current staff who's role has changed

After meeting with the Biological Safety Adviser who will advise on the vaccination requirements, new staff/students should get their line manager/PI to contact HR to arrange an appointment with the OHS provider.

The line manager/PI should provide OHS with the following information

1. Vaccination required
2. Name of person requiring vaccination
3. Date of birth of person requiring vaccination
4. Email address of person requiring vaccination

OHS will then contact the person requiring the vaccination directly to arrange an appointment. Any follow ups required will be advised directly by OHS.

Please inform the Biological Safety Adviser (Karen Scott, Ext 8730, k.scott@abdn.ac.uk) of the appointment and when the vaccinations have taken place so that your records can be updated.

OTHER VACCINATIONS

Guidance issued by the Department of Health and from Grampian NHS Occupational Health Service suggests the following with regard to the need for updating tetanus vaccinations: -

Tetanus

Providing all childhood doses have been given (three as a small child and one at age 13-15 years), with one further dose given 10 years after the teenage dose, lifelong immunity should have been conferred. However a further dose should be considered if an injury is classed as high risk. For example: -

- Any wound or burn sustained more than 6 hours before treatment
- A wound which shows devitalised (dead) tissue, a puncture type wound, or a wound which has had contact with soil or manure (likely to harbour tetanus organisms)
- Where there is clinical evidence of sepsis

Immunocompromised staff and students

Staff and students who are known to have a suppressed immune system should consider this in their risk assessment. There are microorganisms that are more pathogenic in immunocompromised persons. Supervisors should inform students of such risks in project so that the student can either discuss with supervisor or consult Occupational Health Service Provider - an appointment can be arranged via HR.

Packaging and shipment of infectious materials

For the shipment of any infectious materials, the packaging must be done by or checked by a person trained for these procedures. By “infectious materials” we mean not only microorganisms in Hazard Group 2 but also materials such as unscreened blood where there is uncertainty about the infection risk. A list of trained persons can be found in Appendix 4. No such package should be shipped without prior approval of a trained person.

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P.6 Building works and fault reporting

The fabric of the University buildings and the installed services (electricity, water, gas, etc.) are the responsibility of the Estates Section.

- 1) Anyone who notices any parts of the building, which are unsafe and need to be repaired, should contact Estates. Any urgent matters should be notified directly to Estates on their 24-hour emergency telephone number ext. 3939. Routine faults should be reported to the fault desk online or on ext. 3333.
- 2) Anyone planning to bring contractors into the Rowett MUST contact the Rowett TRM in advance to agree any precautions that might be required.

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P.7 Bunsen burners

Bunsen burners represent a serious fire risk and should be operated with care. Several precautions should be taken to avoid the risk of fire.

- 1) Regularly inspect the tubing for deterioration and replace if necessary. Ensure that the tubing is not likely to be caught by anything.
- 2) Tubing should be firmly clipped using a jubilee clip to the gas outlet tap and to the Bunsen burner.
- 3) Place burners in a clear space on the bench and away from any solvents or combustible material/papers.
- 4) Do not place burners in a place where people are likely to stretch over them.

- 5) Use gas igniters to light burner and do not use matches.
- 6) Always turn off the Bunsen completely if you have to leave the laboratory. Turn the flame down to the pilot light if not using the bunsen temporarily.
- 7) Be aware **beforehand** what procedures to follow should a surrounding object catch fire (see section 9 – [Fire safety precautions](#)).
- 8) Care should be taken that any wire gauze mats used are asbestos free.

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P.8 Carcinogens

The procedures in this section are mandatory for work with Category 1 and Category 2 carcinogens.

Carcinogens are divided into three categories.

- Category 1: These are substances *known to be carcinogenic to man*. There is sufficient evidence to establish a causal association between human exposure to a substance and the development of cancer. If purchased from a supplier they will be marked:
 - T; R45 MAY CAUSE CANCER or
 - T; R49 MAY CAUSE CANCER BY INHALATION
 - Category 2: These are substances that *should be regarded as if they are carcinogenic to man*. There is sufficient evidence to provide a strong presumption that human exposure to a substance may result in the development of cancer, generally on the basis of appropriate long-term animal studies and other relevant information. If purchased from a supplier they will be marked:
 - T; R45 MAY CAUSE CANCER or
 - T; R49 MAY CAUSE CANCER BY INHALATION
 - Category 3: These are substances that cause concern for man owing to *possible carcinogenic effects* but in respect of which the available information is not adequate for making a satisfactory assessment. There is some evidence from appropriate animal studies, but this is insufficient to place the substance in Category 2. If purchased from a supplier they will be marked:
 - Xn; R40 POSSIBLE RISK OF IRREVERSIBLE EFFECTS
- 1) Carcinogenic chemicals should not be used for purposes for which a satisfactory non-carcinogenic substitute is available.
 - 2) Work with carcinogens must be conducted in accordance with WRITTEN procedures that are derived from the risk assessment for the work. Risk assessments for work with carcinogens should always consider:
 - processes which can produce aerosols or vapour containing a carcinogen
 - manipulation of carcinogens likely to result in dust formation
 - storage and manipulation of carcinogenic gases, volatile carcinogens and compounds which decompose spontaneously evolving carcinogens
 - weighing of carcinogens and the preparation of solutions containing them
 - the possible effects of static electricity during handling of powders
 - changing traps and exhaust filters
 - response to a spillage or other uncontrolled release of a carcinogen

- decontamination of work areas and equipment
 - disposal of waste
- 3) Carcinogens should be handled only in suitable designated areas with adequate equipment for their containment.
- Designated areas should be marked clearly.
 - Access to designated areas should be restricted to those carrying out the work.
 - The numbers of those involved in the work and entering the designated areas should be kept as low as possible.
 - Effective methods must be devised to ensure people not involved in the work do not enter designated areas
- 4) If small samples of carcinogenic materials need to be taken to non-designated areas (*e.g.* for specialised analysis), samples should be clearly marked as carcinogens and be carried in robust sealed containers. The same stringent precautions as are required in designated areas should be observed in non-designated areas.
- 5) Carcinogens should be kept segregated from all other chemicals in a locked cupboard.
- 6) Protective clothing required should be specified and be worn at all times.
- Protective clothing must be disposable and must be disposed of in the same manner as the carcinogen itself.
 - Contaminated clothing must be disposed of, not sent for laundering, ANY PROCEDURE, WHICH ROUTINELY CAUSES CONTAMINATION OF PROTECTIVE CLOTHING, IS UNSATISFACTORY AND MUST BE IMPROVED.
 - Protective clothing, which has been worn in a designated area, is potentially contaminated and must not leave the designated area except for disposal.
- 7) Standards of personal hygiene in any laboratory should always be high. When working with carcinogens it is particularly important to ensure that the highest standards are maintained.
- No eating, drinking, or applying of cosmetics is permitted in the laboratory
 - There should be no mouth pipetting
 - Any exposed cut or abrasion of the skin must be covered with an appropriate surgical dressing before commencing work or putting on protective clothing. Gloves should then be worn over dressed areas on hands.
 - Hands should be washed and dried with disposable towels before leaving the laboratory

- 8) Decontamination methods for experimental residues and laboratory equipment should ensure complete chemical conversion into non-carcinogenic substances. Written instructions for cleaning and decontamination of equipment must be prepared. Decontamination and cleaning of equipment should be carried out in the designated area.
- 9) Written procedures for disposal of waste must be prepared. Contaminated material that cannot be decontaminated should be double bagged in sealed plastic bags, clearly labelled with contents and carcinogenic nature of hazardous substances and then inform TRM, who will arrange appropriate disposal.
- 10) Any sharps (e.g. needles, broken glass) must be placed in sharps containers (yellow bins with yellow lids) and passed to IMS stores for disposal by incineration. To avoid needlestick injuries, do not re-sheath needles or remove them from syringes before disposal.



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P.9 Cell culture facilities

The use of tissue culture facilities is dependent upon adherence to local codes of practice that must be adhered to.

- 1) Responsible persons must be appointed to be responsible for the cell culture facility and ensure that all users adhere to local rules. Helen Hayes h.hayes@abdn.ac.uk and Nick Hayward n.hayward@abdn.ac.uk are the Rowett contacts and must be consulted before using the Rowett facilities. Rowett local rules can be found in Qpulse EQP052 & EQP053
- 2) The responsible persons must be informed of any new biological materials or hazardous chemicals brought into the unit. They must also be kept fully informed of the nature of all work in progress in the unit. All work with genetically modified organisms must be approved before work is started (see [P.19 Genetic modification work](#)).
- 3) All activities must be assessed for the necessary level of containment (see [P.5 Biological safety](#)). Laboratory personnel must receive suitable and sufficient information, instruction and training in working safely with agents in Group 2 if required. A high standard of supervision of the work should be maintained.
 - a) The laboratory door should be closed when work is in progress.
 - b) Access to the laboratory is to be restricted to authorised persons
 - c) There must be specified disinfection procedures
 - d) Personal protective equipment, including protective clothing, must be stored in a well-defined place, checked and cleaned at suitable intervals

Adequate assessment based on an awareness of the hazards, good organisation of work and **adherence to principles** of good laboratory practice is critical to **the safe use of cell cultures**. It is important that basic quarantine and segregation procedures are adopted to prevent the inadvertent transmission of infectious agents from one culture to another. To guard against this, the following points should be noted.

- 1) Only one cell line should be handled at a time with appropriate decontamination methods used between operations on different cell types. It is also desirable that cell cultures that are known to be infected are handled at the end of the work period or preferably in a different laboratory from those that are known to be infection free.
- 2) Wear a clean labcoat while working with cells – and **not** the same coat that you wear in the general lab.
- 3) Wash your hands before and after dealing with cells.
- 4) While working with cells, do not eat, drink, bite fingernails or otherwise risk ingesting what might be hazardous material.
- 5) Swab down the working surface of the cabinet and also under the perforated surface with ethanol or other appropriate disinfectant **before and after** use.

- 6) **Never** mouth pipette.
- 7) Always use pipetting aids safely in order to prevent breakages and possible injury.
- 8) Always wipe up spillages of cells/contaminated material after treating with appropriate disinfectant. Dispose of paper tissues in correct waste bag/stream (see section 14 – "[WASTE AND ITS DISPOSAL](#)").
- 9) Put all disposable plastics, after use, into an autoclave bag. In the case of plates, media should be removed into the waste container that has appropriate disinfectant. All autoclave bags have to be closed with specific tags and labelled with room number, then taken to the wash-up room (IMS 1.21). Any non-autoclaved material should be disposed of in yellow safety bags. When these are $\frac{3}{4}$ full they should be closed with specific tags, labelled with room number and taken to the yellow wheelie bins contained in the yellow containers outside the IMS building.
- 10) Always have regard for sterility. Do not move hands or arms over an open culture dish or medium bottle; put the lids of culture dishes or medium bottles the right way up, on the cleaned surface of the hood, not inverted; remove sterile pipettes without contaminating the pipette.
- 11) Never put a pipette that is non-sterile, or has come into contact with cells, into a bottle of sterile medium.
- 12) If bottles of medium or serum have been warming in the water bath, wipe with an ethanol-soaked swab before transferring them to the hood. Water baths tend to harbour bacteria.
- 13) Look at cells frequently under the microscope to monitor their general well-being and ascertain any contamination problems as early as possible.

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P.10 Centrifuges

The major hazards associated with centrifuges are:

- physical contact between the operator and the rotating head;
- mechanical breakage of rotors caused by corrosion or use in excess of manufacturer's recommended limits; and
- severe vibration caused by an unbalanced rotor.

A rotor can suffer stresses similar to those occurring in high-speed aircraft engine components. The periphery of a 10-cm rotor travelling at 50,000 rpm is travelling at over 1,100 miles per hour. The rotor is stressed by every acceleration/deceleration cycle and undergoes measurable stretching each time it accelerates. Mechanical breakage of unbalanced rotors and the vibration resulting from an unbalanced rotor can cause extensive and expensive damage as well as having potential to cause severe injury to anyone in the same room as the centrifuge.

To prevent injury centrifuges should be:

- used in the correct manner; and
- regularly inspected and maintained.

Note: The formation of aerosols when samples of infectious material are centrifuged may also be a hazard and may require the use of sealed centrifuge buckets.

Correct use of centrifuges

- 1) Centrifuges may be operated only by staff in supervisory positions or students under the direct instruction of their supervisor.
- 2) If you are unfamiliar with the operation of any machine, seek assistance before you use it.
- 3) The centrifuge lid must be closed whenever the rotor is in motion and must be interlocked so it cannot be opened when the rotor is in motion.
- 4) Do not stop the rotor by hand or indirectly by the application of an implement to the rotor. Stop the centrifuge by returning the control to zero, not by switching off the power supply.
- 5) If there is any indication of malfunction, stop the machine immediately and contact your immediate supervisor or a Rowett Safety Coordinator/ Lab Coordinator.
- 6) Follow the manufacturer's instructions, particularly regarding balancing tolerances and operating speeds for different rotors. Note that balancing by volume is not suitable for dense solutions (e.g. sucrose solutions must not be balanced with the same volume of water). Balance accurately by weight.
- 7) Before starting a run, inspect the rotor and tube caps for signs of corrosion or cracks. Never use faulty parts.

- 8) Ensure that the outsides of containers are clear and free of drops of liquid before placing them into the rotors (drops of liquid could be a cause of corrosion or contamination). If any liquid is spilt into a centrifuge or onto a rotor it is crucial that it is removed immediately and the equipment cleaned using an appropriate method.
- 9) Never leave a centrifuge while it is accelerating. Many faults occur during the acceleration phase of a run. If you are present, you can immediately turn the machine off.
- 10) All free-standing centrifuges should have a logbook. Always fill in the logbook, giving all the details required. The replacement times for rotors and drive mechanisms are calculated from the data in the logbook.
- 11) Always clean and dry the rotor and the centrifuge carefully after use. It is important to remove all traces of materials that could promote corrosion, stress cracking or contamination. Mild detergent (*e.g.* Teepol), possibly with gentle brushing, is all that is required for cleaning. Do NOT use agents that will corrode the rotor (*e.g.* NOT bleach/oxidising agents such as chlorox). Cidex can be used. Avoid scratching a rotor.
- 12) If rotors require biological disinfection, do NOT use agents that will corrode the rotor (*e.g.* NOT chlorox). Cidex can be used.
- 13) Always leave the lid “ajar” when the centrifuge is not in use. This minimises corrosion/rusting and build up of biological contaminants.

Inspection and maintenance of centrifuges

Centrifuges should be covered by maintenance contracts and inspections are undertaken every 6 months. Records of maintenance should be retained and date of last inspection noted on each centrifuge. Record of inspection should be monitored during safety inspections.

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P.11 Chemical safety

Before the work commences, anyone working with chemicals of any sort must ensure that they:

- understand the hazards associated with the chemicals
- know what precautions should be taken.

The main hazards of chemicals are:

- toxicity of chemicals if they enter the body;
- corrosive nature of some chemicals in contact with human tissue;
- flammability of some chemicals; and
- reactivity of some chemicals - including incompatible chemicals coming together.

These hazards need to be considered during:

- storage of chemicals;
- use of chemicals; and
- disposal of chemical waste.

Consider also what will be done if there is a spillage (or other uncontrolled release) of a chemical.

Safety data sheets

It is a legal requirement that the supplier of a chemical must provide a Safety Data Sheet to the purchaser of the chemical. If you have purchased a chemical and do not have the hazard data sheet and cannot find it on the supplier's website, contact the supplier and request one. Safety data sheets (SDS) are available on websites from various chemical companies of bodies, e.g. [VWR](#); [Sigma-Aldrich](#); [Fisher](#); [Interactive Learning Paradigms](#); and [Environmental Science](#).

Unless the chemical is one whose properties are well known to the user, it is essential to consult a Safety Data Sheet. Supervisors should get their students into the habit of consulting Safety Data Sheets as part of the process of carrying out risk assessments. Details on the handling, storage and disposal of hazardous chemicals should be incorporated into risk assessments as should procedures for dealing with accidental spillages.

Risk assessment

It is well established in law that those controlling the work should determine how it is to be carried out safely. Risk assessments must always take account of the risks

created by any chemicals which are used (see section 4 - "[Risk assessment](#)" for details of how risk assessments should be done)

The wide range of chemicals that are used in the Rowett means that it is only possible in this handbook to provide very general guidance on precautions to be taken. Supervisors of those using chemicals are responsible for ensuring that specific hazards are identified and the necessary precautions are taken

Storage of chemicals

- 1) All chemicals (either in the stores or in the laboratory) must be correctly labelled. Materials purchased from suppliers should already be correctly labelled. When solutions are prepared in the laboratory or when chemicals are dispensed or repacked, they must be clearly labelled using tape and any hazards indicated with appropriate hazard symbol labels. This includes ethanol dispensed by IMS stores.
 - Correct chemical names are required. Labelling a bottle only as "solution A" is NOT acceptable. Consider what happens if the bottle leaked or was knocked over when the person making the solution is away from the lab.
 - Durable labels are required (*e.g.* marker pen on glass is not acceptable).
- 1) Chemicals must be stored so that they cannot accidentally come into contact with incompatible chemicals (see [Appendix 2](#) for a list).
 - When making arrangements for storing chemicals consider the effects of two chemicals coming into contact if there was a spillage or a leak. With some incompatible chemicals violent reactions can occur if the chemicals combine under uncontrolled conditions. With other chemicals, uncontrolled mixing can result in the production of highly toxic gases or fumes.
- 3) Bottles of >1 litre containing liquids must be placed in bottle carriers for transport to/from storage areas outside the laboratory. Always check the integrity of wire carriers before using. When carriers need replaced, purchase totally enclosed ones with sealed lids. These help contain possible spillages and prevent point impacts on bottles.
- 4) Highly flammable liquids must be transported and stored in sealed carriers. For storage of highly flammable liquids, see [P.21 – 'Highly flammable liquids'](#).
- 5) For the transport of dangerous chemicals in University vehicles consult a Rowett Safety Coordinator, and check the guidance notes (<https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#transport-of-dangerous-goods>).

Chloroform

Chloroform is a class 2 carcinogenic (see [P.8 Carcinogens](#)) and should, like phenol, be used in a fume hood with full protective clothing. Phenol/chloroform and TRIzol mixtures are used in the process of DNA extraction, but many alternatives exist and

the Rowett very strongly recommends that such alternative techniques are used, where possible.

Dimethylsulphoxide (DMSO)

Dimethylsulphoxide (DMSO) is rapidly absorbed through the skin. Great care should be taken when it is used as a solvent for other toxic or carcinogenic substances as DMSO facilitates their absorption. On its own it is relatively non-toxic.

Drugs – legal restrictions and Misuse of Drugs Act

Attention is drawn to the Misuse of Drugs Act. The Act gives three lists of drugs.

- Class A: opiates, narcotics and hallucinogens and N, N-dimethyl- and N, H-diethyl-tryptamine and certain chemicals such as 4-phenyl-piperidine-4 carboxylic acid ethyl ester,
- Class B: amphetamines, cannabis, *etc.*
- Class C: compounds which have effects on the central nervous system; examples are pemoline and methaqualone.
- It is an offence to make or possess any of the compounds listed in the classes except for specific purposes and conditions.
- If you have permission to use these drugs, they must be kept in a locked cabinet.

Those planning to make or use compounds of this kind for research purposes must consult the list in the Act, consult with a Rowett Safety Coordinator and enquire from the Home Office the exact regulations governing their use.

Drug precursor chemicals

Legislation on the regulation of drugs precursor chemicals in the United Kingdom and Export of these compounds outside the EU came into force on 18th August 2005 (EC regulation No 273/2004). This legislation affects Universities in the following ways:

- you must obtain a licence for your university to enable you to purchase category 1 chemicals
- you must complete returns for the Home Office on all category 1 chemicals and some category 2 chemicals
- you must have a compliance officer to deal with these matters. They will act on the university's behalf in regulating this new legislation. This will include advising the competent authority on any potential illicit usage of the compounds included in all three categories,

These are all mandatory requirements.

Chemicals and categories include:

Category 1

- Benzyl methyl ketone (BMK)
- Acetylanthranilic acid
- Isosafrole
- Piperonyl methyl ketone
- Piperonal
- Safrole
- Ephedrine
- Pseudoephedrine
- Norephedrine
- Ergometrine
- Ergotamine
- Lysergic acid

Category 2

- Potassium permanganate
- Acetic anhydride
- Phenylacetic acid
- Anthranilic acid
- Piperidine

Ethers and formation of organic peroxides

- 1) Dialkyl ethers and cyclic ethers (*e.g.* tetrahydrofuran, dioxan) form explosive peroxides when allowed restricted access to air and exposure to light. They should therefore be stored in dark bottles with the air space above the liquid kept to a minimum. Bottles containing ethers should not be topped up as this can lead to the formation of peroxides in the bottle.
- 2) Do not attempt to distil the low boiling point aliphatic ethers nearly to dryness because this concentrates the peroxides and can cause dangerous detonation.
- 3) Test strips to enable testing for peroxides must be purchased by those planning to hold stocks of ethers. Opened bottles should be tested for peroxides before use and at least annually.
 - Date and result of annual test must be recorded on a label on the bottle along with the name of the person carrying out the test.
 - Date of opening of a new bottle should be recorded on a label on the bottle.
- 4) Peroxide can be removed from ether by washing with sodium metabisulphate, or acidified ferrous sulphate, or by passing the ether over alumina. It should be noted that on prolonged storage of ethers the peroxides, mainly hydroperoxides, which are initially formed might be converted into secondary products, such as dialkyl peroxides. These products (also explosive) are difficult to detect.


- 5) Di-isopropyl ether presents an extremely severe peroxide hazard. Its structure is such that peroxidation is very rapid and the hydroperoxide settles out as a readily detonated crystalline solid. The maximum permissible storage time is one month unopened and one week opened. A crystalline deposit near the stopper is a danger sign. If this is seen do not attempt to open the bottle, but consult a Rowett Safety Coordinator about disposal.

Ethidium bromide gels and solutions

Ethidium bromide is used in gel electrophoresis for visualisation of nucleic acids. Several alternatives exist (<http://bitesizebio.com/417/ethidium-bromide-the-alternatives/>) and these are preferred. If ethidium bromide has to be used, the following should be considered: It is a potent mutagen and should therefore be handled and disposed of with care.

Nitrile (blue) gloves - NOT latex - are recommended with ethidium bromide because they are more robust and less likely to develop pin holes. Nitrile gloves are supplied in stores, at a very similar cost to the latex gloves, so are the glove of choice when handling ethidium bromide gels. They also reduce allergenicity.

Handling of ethidium bromide

- 1) The Safety Committee strongly advocates that ethidium bromide is confined as far as possible to a specific designated bench area clearly delineated by cytotoxic tape. It also advocates using pre-prepared stock solutions wherever possible. Solid ethidium bromide **MUST** be weighed out in a fume cupboard. Stock solutions should be kept in clearly labelled, darkened bottles and stored at 4°C. It should only be opened in a fume cupboard. Tips used **MUST** be discarded into "cytotoxic waste" bins (yellow bins with purple lids). Ethidium bromide should only be added to heated agarose solutions when they are cooled below 50°C. This prevents the possible release of ethidium bromide vapour.
- 2) All treated gels must be transported in robust leak-proof containers. The following precautions must be taken to avoid contamination of non-laboratory areas and door handles.
 - a) Anyone carrying gels must have one hand ungloved, to open doors without contamination. The other hand should be gloved to carry the container with the gel. 
 - b) A second clean glove should be taken for handling the gel in a room suitable for viewing gels. The room must have adequate ventilation for working with ultraviolet radiation (and use appropriate safety visor - see [P.34 Ultra-violet radiation](#)).
 - c) Remove a glove to then handle items to be touched by those not wearing gloves (e.g. door handles, light switches, computer keyboards).

Ethidium bromide disposal

- a) All gels containing ethidium bromide, or which have been in contact with buffers containing ethidium bromide, must be disposed of by incineration. Disposal by other methods is not acceptable. Waste gels should be placed in yellow "cytotoxic waste" bins (yellow bins with purple lids). When full, the lid should be put on and sealed, labelled with name, room number and contents, then taken to the large yellow bin in cages outside IMS (key from IMS stores). Arrangements will be made by IMS stores to send it *via* a licensed waste contractor for incineration.
- b) Extremely dilute buffers (typically <0.5 micrograms per ml) can be poured down the drain IF they are then followed by large amounts of water.
- c) More concentrated solutions (*e.g.* 10 mg/ml stock solutions) must either be incinerated or treated to make safe before disposal to drain. Small bottles of stock solutions can be placed with gels in "cytotoxic waste" bins and sent for incineration. Treating solutions involves passing through commercially available treatment columns (*e.g.* Merck 43721 2Y) or mixing with activated charcoal and filtering off the charcoal.

Formaldehyde disposal

All solutions containing formaldehyde should be disposed of as chemical waste and not disposed to drain.

Hydroquinone in photographic developers

There is a maximum exposure limit to hydroquinone that must be observed (see manufacturer's instructions), and ventilation must be adequate for photographic dark rooms.

Mercury

Any remaining mercury-containing thermometers must be replaced with either digital thermometers or ones filled with non-toxic coloured spirit. Mercury containing bulbs (*e.g.* from fluorescent light sources) should be disposed of via the chemical waste store (contact Louise Cantlay for details – ext. 8667). Mercury vapour is a cumulative poison: mercury should never stand exposed in the laboratory. Do not allow mercury to run down a drain. Any spillage should be cleaned up immediately using mercury collectors, obtained from either a Rowett Safety Coordinator or Jencons-PLS. Any mercury not able to be cleaned up in this way should be sprinkled with zinc dust, available in the balance room in the Polwarth Building, to form an amalgam, and then swept up.

Perchloric Acid

There is a long history of accidents involving perchloric acid. Most involve either its exceptional oxidising power or the inherent instability of its covalent compounds, which can form readily. Although commercial 70-72% acid is a very strong but non-oxidising acid, it becomes an extreme oxidant and powerful dehydrator at elevated temperatures (160°C) or when anhydrous/crystallised. Wooden benches, which have

been subject to occasional perchloric acid spills, have been known to explode on percussion.

Phenol (burn treatment)

For a small phenol splash on the skin the initial treatment should be rapid and copious irrigation with cold water. Safety data sheets often suggest a special treatment for phenol contamination of the skin, such as polyethylene glycol in methylated spirits. For small splashes, very little extra is gained by subsequent treatment with polyethylene glycols. Since this corresponds to the most likely scenario in our laboratories it is not necessary to stock any specific treatment for phenol burns. The recommended initial treatment, as for all chemical contamination of the body, is rapid and copious irrigation with cold water. For nearly all chemicals this should continue for at least 10 minutes. For larger skin exposures, treat as above but seek medical advice immediately.

Silica gel

Use silica gel without cobalt chloride. CoCl_2 is now classified as a Category 2 carcinogen (see [P.8 Carcinogens](#)). Until recently, most self-indicating silica gels contained small amounts of cobalt chloride. Silica gel is now available with much less toxic indicators.

Strong acids

Always add acid to water when diluting strong mineral acids. Mineral acids will burn skin. If splashed, immediately irrigate with cold water for 10 minutes.

Strong alkalis

Sodium, potassium or calcium hydroxide and ammonia cause burns and rapid damage, particularly to eyes. It is recommended those opening bottle should wear eye protection (goggles/face mask). Always open bottles of concentrated ammonia in a fume cupboard.

Violent reactions

Some materials can react suddenly and violently with little or no warning. Some of these are listed below. A further list of incompatible reagents is given in [Appendix 2](#).

- Strong acids with strong bases
- Oxidising agents and metals/reducing agents/sulphuric acid/wood/paper
- Metal hydrides, *e.g.* sodium borohydride with water
- Nitric acid (concentrated) with alcohol

Ammoniacal silver nitrate solution residues

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P.12 Compressed gases/gas cylinders

The Rowett building has a piped gas system; all cylinders are stored externally and the gases are piped directly into the rooms they are required. The TRM must be consulted before cylinders may be brought into the building or new equipment requiring a gas supply is purchased.

The main hazards associated with cylinders of compressed gas are:

- the explosive release of energy stored in a cylinder in event of an uncontrolled discharge (cylinders can become jet propelled);
- the mass of the cylinder (cylinders are tall, thin and heavy; they can inflict damage and injury if they fall over); and
- the properties of the gas stored in the cylinder (*e.g.* flammable, asphyxiating, toxic, corrosive, oxidant).

To prevent harm, cylinders should be:

- stored correctly;
- moved correctly; and
- used correctly.

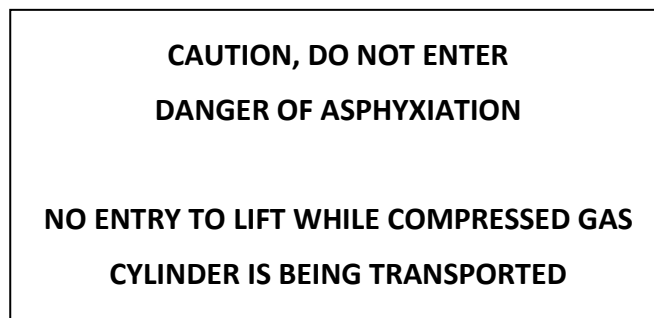
The handling, storage and transport of compressed gas cylinders should **only be undertaken by those with appropriate training**. Should you need to handle cylinders, then you should arrange to receive training from one of the trained staff or arrange to undertake training by contacting Lynne Lumsden. A list of trained users can be found on the IMS safety website (<http://www.abdn.ac.uk/ims/safety/az.php>).

Storage of cylinders

- All cylinders not in use (*i.e.* not connected to equipment) must be stored outside the building in the cylinder store cage behind the Rowett building. Access to the store is controlled and it is kept locked. Keys are available from Rowett TRM.
- Only people who have been trained in cylinder handling should work with or move cylinders.
- Cylinders in the store must be correctly secured in a vertical position.
- Cylinders in the store are segregated according to industry guidelines (to limit the consequences of a leak of gas or fire)
- Stock is rotated so that oldest stock gets used first
- Nothing else is kept in the store except cylinders.

Movement of cylinders

- Cylinders must be transported secured vertically in a cylinder trolley.
- Within the cylinder store/laboratory, cylinders should be “milk churned” into position. Cylinders must never be rolled along the ground.
- The pressure regulator should be removed during transport, unless using a trolley specifically designed for the purpose.
- While moving cylinders from the store or within the laboratory, keep unsecured vertical cylinders under direct control. Never turn your back on a free standing cylinder. The consequences of falling cylinders can be severe.
- Wear protective footwear and industrial gloves when handling gas cylinders
- In lifts, all cylinders must be secured but unaccompanied - full or empty.
 - A leak from a full/partially full cylinder can quickly make air in a liftcar unbreathable. If the lift stops between floors (quite common in the IMS), the consequences may quickly be fatal.
 - This also avoids injury from cylinders falling in transit, or confusion/misconceptions over procedures.
 - Use a goods lift wherever possible. There is a system in place that prevents passengers entering during transit. A free-standing labelled sign (positioned outside the Rowett goods lifts) or labelled wide tape must be placed *inside* the lift entrance to prevent anyone using the lift. The sign must be visible to people attempting to enter the lift. It should have the following content:



- In the Rowett building, boards to indicate transport of cylinders are located near GOODS lifts and MUST be used.

Use of cylinders

- All cylinders in a laboratory must be mounted vertically on a stand or secured to the bench or directly to the wall.
- Cylinders should be fitted with a regulator valve of the correct type (*e.g.* it is unsafe to fit a nitrogen regulator to an oxygen cylinder). The cylinder key should be secured to the gauge/cylinder so it is always available for emergency cutoff.

- Regulators must be replaced every five years (from date of manufacture) regardless of the amount of use received
- Do not use excessive force on valves and gauges. If a cylinder valve cannot be opened readily, it should be returned to the supplier.
- Never use oil or grease on any part of a valve or regulator. They can explode under pressure. Do not use PTFE tape on any part of a compressed gas system. If a gas tight seal cannot be obtained, change the fittings.
- Always open valves slowly; rapid opening may result in an explosion.
- Check your equipment regularly for leaks. Always use the proprietary liquids that are intended for detecting leaks. (Do not use soap and water. Some soaps contain fats that react violently with oxygen.)
- Regulator valves are not intended for use with low flow rates and low back pressures. Always use a needle valve to control gas flow from the low-pressure side. These can be obtained from "BOC" as FINE CONTROL VALVES, the thread depending on the gas to be controlled.
- All connections should be secure; a "jubilee" clip is ideal. A safety valve of some form is advisable to prevent high pressure being applied to your apparatus.
- After use, always shut off the gas at the cylinder valve, and release the pressure in the gauges before finally shutting all valves. Do not rely on the regulator to stop the gas flow for more than brief periods.
- Understand the hazardous properties of the compressed gases you are using (e.g. flammability, toxicity).



BRIEF SUMMARY

- SAFE GAS CYLINDER STORAGE & HANDLING

- Secure cylinders properly.
- Inspect for leaks and check brackets.
- Make sure it is safe to change regulators.
- Transport gas cylinders securely - they travel alone in lifts.
- Be sure you are trained in the safety rules for gas cylinder use, handling and storage.

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P.13 Computer workstations

Using computer display screens and keyboards for prolonged periods can be a health hazard. The principal hazard relates to the arms, where work related upper limb disorders can develop repetitive strain injuries (RSIs). Eye strain can also develop leading to headaches.

The risks are controlled by applying ergonomic principles to the design, selection and installation of computer equipment; the design of the workplace and the organisation of the task. Consult Rowett Safety Coordinators for advice and a list of trained computer workstation assessors.

The risk is only significant for those using computer workstations intensively for a large part of each working day. However, as this applies to many staff, all computer users should be aware of the associated health risks.

Computer workstation assessments

All staff will complete the BeOnline Computer workstation training with assessors being asked to assess any staff member with particular issues or who require re-assessing within the 3 years until the next BeOnline assessment. Each assessment takes 10-20 min, with the user at their specific workstation. If a user changes their workstation or becomes pregnant, a new assessment should be undertaken. BeOnline assessments will be renewed at least every 3 years.

A checklist is completed by the assessor and countersigned by the user after training. Completed checklists should be maintained with Rowett safety records.



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P.14 Cryogenic fluids (liquid nitrogen) & dry ice/cardice (solid carbon dioxide)

The hazards arising from low temperature liquefied gases (cryogenic fluids) are:

- asphyxiation from oxygen deficient atmosphere (*e.g.* in poorly ventilated confined spaces)
- fire – the surface of liquid nitrogen can be enriched for oxygen
- cold burns - brief contact with metals/surfaces at cryogenic temperatures can produce severe burns.
- over-pressurisation
- very low temperature effects on materials (*e.g.* becoming brittle).

To prevent cryogenic fluids becoming a harmful, they must be stored, moved and used correctly.

Storage of bulk stocks of cryogenic fluids

- 1) Bulk stocks of liquid nitrogen are contained in pressurised 2000L tank stored outside IMS room 1:39.
- 2) In this area (Rowett TRM) is responsible for ensuring that:
 - The storage area is satisfactorily maintained
 - Necessary personal protective equipment (PPE) is available
 - Appropriate warning notices are posted
 - Equipment used for storage is suitable for the purpose and is maintained in a good condition.
- 3) IMS room 1:39 has an oxygen-depletion monitoring system, with alarms both inside and outside the room. If you are in the room when the alarm sounds, leave immediately. If you are outside, do not enter the room. Do not silence the alarm. Look through the window for anyone in the room. If there is someone inside, do not enter. During office hours - contact staff trained with breathing apparatus who may be able to make a rescue (see [section 11 Spillages](#)). Outside normal hours, contact security (ext. 3939) to call someone on the list for the 'IMS freezer room'. (NB: electricians and security staff are NOT trained to respond to the oxygen alarm).

As a guide to how much nitrogen might cause serious oxygen depletion, 1/7th litre of liquid nitrogen/m³ will decrease oxygen content by 2% (air normally contains 20.9% oxygen). 18% oxygen is potentially dangerous, while 10% can produce permanent brain damage and death.

Transport of cryogenic fluids

Cryogenic fluids must never be transported in lifts accompanied by people. They must always travel unaccompanied. A lift cage is a confined space. If the lift were to become trapped between floors for a period it is possible that evaporation of the fluid could cause the air to become unbreathable. A 1-litre flask of nitrogen can displace enough air in a lift to cause asphyxia.

Place Barriers across the *insides* of the entrances to the lift to prevent anyone entering and using the lift.

CAUTION

DO NOT USE THIS LIFT FOR PERSONNEL WHILE TRANSPORTING COMPRESSED GAS or LIQUID NITROGEN

For additional assistance
Contact any IMS Safety Advisor

In the Rowett building, boards to indicate transport of liquid nitrogen are located near lifts and these must be used. Even small Dewar flasks of nitrogen can be dangerous and they should be carried carefully and slowly up or down stairs.

Use of cryogenic fluids

- 1) No one should work with cryogenic fluids until they have been thoroughly instructed and trained in the nature of the hazards and the precautions to be taken. The hazards associated with cryogenic fluids will not be readily apparent to someone who has not received appropriate training.
- 2) If contact with the cryogenic fluid is possible, eye protection (preferably a full-face visor) must be worn. Laboratory coats must be fastened properly. Watches and jewellery that could trap cryogenic fluid close to the skin should not be worn.

Gloves must be worn and they should ideally be “Cryo-gloves” (gloves specially designed for low temperature work). If other gloves are used they should be non-

absorbent leather gloves and they should be a loose fit so they can easily be removed if fluid should splash into them. Gauntlet gloves should not be used as they increase the likelihood of a spillage going into the glove.

Those working with cryogenic fluids must be aware of the first aid treatment for cold burns.

- 4) Materials used in experiments involving cryogenic fluids must be chosen with care. The most significant considerations are that of brittle fracture and ensuring that joints are suitable for the temperatures that will be encountered.
- 5) Care should be exercised when handling small, screw-capped vials stored in liquid nitrogen, due to the risk of explosion or the release of nitrogen jets. Always wear gloves and eye protection, and open the vial in a direction pointing away from your body (see [Removing cryovials from liquid nitrogen storage](#) below).
- 6) Cryogenic fluids should be dispensed only into vessels specially designed for use with the particular fluids concerned. The vessels must have vented lids or, safety relief valves (if of the self-pressurised type). The lid on a vessel should be secured down only if the securing method is integral to the manufacturer's design of the lid and permits the vessel to vent with the lid secured in place. Vessels should be clearly labelled to identify the cryogenic fluid that they contain. Eye protection should be worn, as there is always risk of Dewar vessels containing liquid nitrogen suddenly shattering; this is most likely to happen when they are being filled or carried.
- 7) Excess, unrequired liquid nitrogen in a small flask should not be returned to bulk storage flasks. The flask should be placed in a fume cupboard overnight and the nitrogen allowed to evaporate.

Removing cryovials from liquid nitrogen storage

Wherever possible, cryovials should be stored in the vapour phase of a liquid nitrogen storage tank. If stored in the liquid phase, liquid nitrogen can enter the cryovial and, therefore, the vial can explode when removed from the liquid nitrogen storage tank. This will send shards of shattered plastic into a person's hand or face, causing potentially serious injury, and blood contamination with the contents. The following procedures should be adopted for removing vials from liquid nitrogen storage;

- Every vial should be treated as if it could explode. Always wear cryoprotective gloves, full face-shield and a fastened laboratory coat while handling the vials.
- Use forceps to handle the vials.
- Place the vial immediately inside a secondary containment (*e.g.* sandwichbox + lid) to allow it to thaw. If the vial is going to explode, this usually occurs just after removal.
- Consider sealing the individual vials in cryoflex tubing or equivalent which is designed to prevent penetration by liquid nitrogen.

Use of Cardice (solid CO₂)

- 1) Solid carbon dioxide presents two safety hazards – burns due to low temperature and danger from asphyxiation as the CO₂ escapes into the atmosphere. CO₂ release can be rapid when pellets are in contact with water and so cardice should be kept away from sinks and places where pellets may warm up rapidly.
- 2) Handle Cardice with cryogloves and store in polystyrene boxes with a lid. Do not discard cardice in sinks. Small quantities of cardice (*e.g.* in boxes ~30x30 cm) can be left to slowly evaporate through the polystyrene/lid.
- 3) Packages transported in cardice must be appropriately labelled. For air travel, DHL accepts only dry ice UN1845 packed according to packing instruction 904 of the IATA Dangerous Goods Regulations. They restrict carriage to various European states. For USA and other countries, TNT are used as carriers.
 - The packaging must permit release of carbon dioxide gas and prevent build up of pressure.
 - The packaging must be marked with:
 - shipper and consignee's name and address
 - UN 1845 Carbon Dioxide, solid
 - Net Quantity..... Kg



- A class 9 label:
 - The airwaybill, in addition to the above details, must include the statement: "Dangerous Goods – Shippers Declaration not required"
 - For the shipment of any infectious materials, the packaging must be done by or checked by a person trained for these procedures. By "infectious materials" we mean not only microorganisms in Hazard Group 2 but also materials such as unscreened blood where there is uncertainty about the infection risk. A list of trained persons can be found on the website. No such package should be shipped without prior approval of a trained person.
- 4) Larger quantities of cardice and bags from BOC must be stored in appropriate containers and not left open on floors.

Use of ultra-low temperature freezers

- 1) Skin burns can also be got from touching metal surfaces within $-70/80^{\circ}\text{C}$ freezers and gloves should be worn when using freezers.
- 2) Contact names and telephone numbers must be attached to the door of $-70/80^{\circ}\text{C}$ in case the alarm starts. If the alarm is set off during routine use, you should leave a note for others, indicating you are aware the alarm is ringing and it should reach temperature soon. Write the freezer temperature, time and date. Return to the freezer later to ensure the preset temperature is reached and the alarm is off, and then remove the warning notice.

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P.15 Dangerous pathogens and toxins

As part of the Anti-Terrorism, Crime and Security Bill, 2002, the University is under a legal obligation to inform the Home Office of any holdings of a number dangerous pathogens and toxins.

Dangerous viruses, *Rickettsiae* and bacteria:

These are primarily Category 3 or 4 organisms and the full list is available from the Rowett Biological Safety Adviser. If you have any doubt about the Hazard Category of an organism, please seek advice.

Dangerous toxins

Abrin

Saxitoxin

Botulinum toxins

Shiga and shiga-like toxins

Clostridium perfringens epsilon toxin

Staphylococcal enterotoxins

Clostridium perfringens enterotoxin

Tetrodotoxin

Conotoxin

Viscum Album Lectin 1 (Viscumin)

Modeccin toxin

Volkensin toxin

Ricin

Note that any reference to micro-organism also includes

- any genetic material containing any nucleic acid sequence associated with the pathogenicity of the micro-organism; and
- any genetically modified organism containing any such sequence.
- subunits of the toxin

There are some exemptions to the requirement to notify the Home Office - the full list can be obtained from the Rowett Biological Safety Adviser. An important exemption is that quantities of toxins not exceeding 5 milligrams within any single secure area of the premises need not be reported to the Home Office. Quantities of these toxins of less than 5 mg should be locked in the designated Rowett fridge/freezer (see below) and/or locked room. A locked box within an unlocked fridge is NOT sufficient. Botulinum or *Clostridium perfringens* toxins are not subject to this exemption so **any** quantities of those toxins need to be reported to the Home Office via the Rowett Biological Safety Adviser.

Facilities for storing such toxins are available in the Rowett. Any group who uses any of the listed toxins or pathogens must contact the Rowett biological safety advisor (Karen Scott) for further advice.

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P.16 Electrical equipment

The main hazards arising from the use of electrical equipment are:

- electric shock
- fire caused by overheated conductors
- explosion due to a spark in a flammable atmosphere.

To prevent electricity becoming a source of harm, electrical equipment should be:

- 1) installed correctly and be suitable for the application
- 2) used correctly
- 3) maintained in good condition.

Selection and installation of electrical equipment

- 1) The electrical installation in the building up to and including the electrical sockets or other point of supply is the responsibility of the University's Estates Section. ONLY Estates electricians or their contractors can interfere with the electrical installation or attempt to carry out repairs.

Anyone who needs changes made to the installation or believes part of it may be faulty should contact the Rowett TRM who will arrange for Estates to carry out any necessary work.

2) Electrical equipment must be suitable for the area in which it will be used. Particular care is needed when selecting equipment for use:

- outdoors
- in areas where there is water
- in places where electrolytes or saline solutions are used
- in cold rooms
- in places of high humidity
- in places where flammable atmospheres might develop.

It is unlikely that “normal” electrical equipment will be suitable for any of these conditions. Anyone wanting to use electrical equipment in one of the above environments or any other hazardous environment should contact a Rowett Safety Coordinator or TRM for advice on the selection and installation of suitable equipment.

3) Any new electrical equipment bought within the Rowett should be marked with date of purchase but need not be tested. Any equipment brought in that is not new should be tested for electrical safety before being put into use. This includes equipment brought from home as well as equipment received from other University locations. Contact the Rowett TRM to obtain a PAT tester. Such PAT testing is then reviewed every 2-3 years.

4) Only competent persons should fit three-pin plugs and other electrical connections. (If you are in any doubt as to whether you are a competent person, then you are not!). At the Foresterhill site, phone the fault desk (3333) for electrical repairs and plug fitting.

Correct use of electrical equipment

1) Carry out a visual inspection of any electrical equipment before connecting it to the electrical supply. (Look for any obvious damage such as frayed cables and damaged plugs)

2) If equipment is faulty, disconnect it from the supply and take steps to prevent use. Place a notice on the equipment AND the plug. Arrange to have the equipment repaired.

3) Always replace a blown fuse by a fuse of the correct rating. A 13 amp fuse will be too large for most Rowett equipment. Fuses must be fitted in the live lead only. If the replacement fuse blows, the equipment should be regarded as faulty and not reconnected to the power supply until the fault has been repaired.

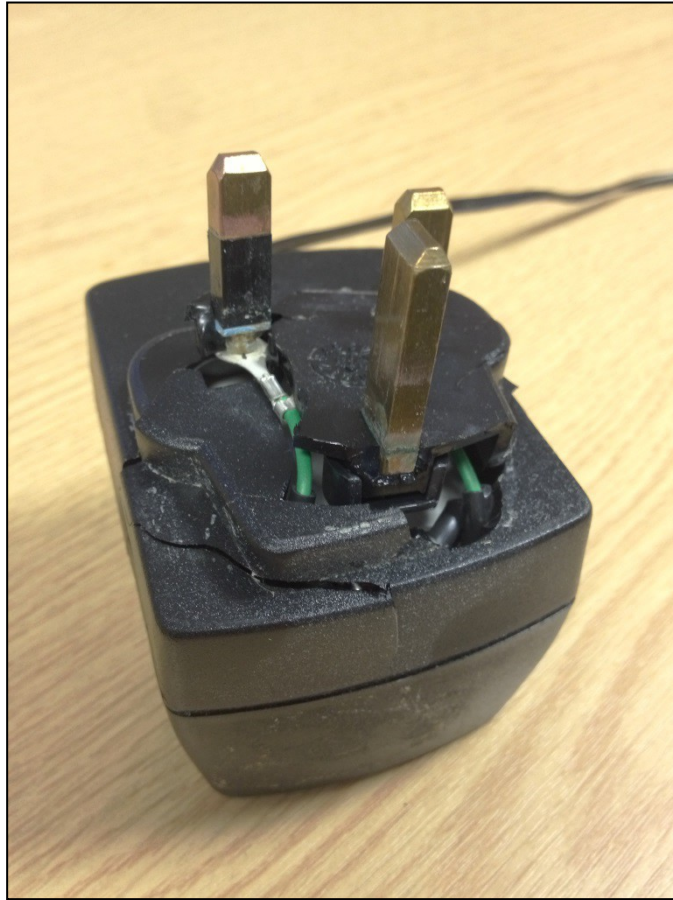
4) Do not use multiway plug-in adapters with electrical equipment. They can lead to overloading of sockets. Power only one piece of equipment from each socket, or use a fused distribution board. If there are not enough sockets available, arrange to get some more installed.

5) Where water may be present, always provide additional protection by the use of an earth leakage circuit breaker (ELCB). They may already be installed as part of the electrical installation for the building - check. If they are not already fitted to the installation, portable ELCBs should be obtained from Estates.

- 6) If solutions or chemicals are spilled on or near equipment, switch off and disconnect the apparatus by removing the plug. Clean the apparatus immediately before attempting to use again.
- 7) High voltage power packs used in electrophoresis are potentially lethal and must have safety connectors. Older electrophoresis equipment must be protected by a cage/box designed to shut off power when the box is opened. Electrophoresis apparatus must be marked: "DANGER HIGH VOLTAGE - DO NOT TOUCH". Ensure all leads are tidy and not in a position where they might be caught.
- 8) Only attempt to repair electrical equipment if you are competent to do so. When carrying out repairs always disconnect the equipment from the supply by pulling out the plug. Take steps to prevent anyone plugging it in again while you are carrying out the repair.

Maintenance of electrical equipment

- 1) A co-ordinated programme for inspection and testing of major and common electrical equipment is arranged by the Rowett TRM. Service of specialised equipment should be arranged by PI through the Rowett TRM.
- 2) Those responsible for inspections will:
 - determine the frequency of inspections and tests for the different types of electrical equipment in the Rowett;
 - ensure that inspection and test is carried out at the specified intervals;
 - ensure that equipment is marked to indicate that it has been inspected or tested; and
 - maintain records of inspections and tests.
- 3) Those staff with room responsibility are responsible for arranging PAT testing of small pieces of equipment. They should be tested at least every 2-3 years. The Rowett Safety Coordinators will provide advice on operating electrical 'PAT' testing equipment and on the visual inspection of electrical equipment. PAT testers are available from the Rowett TRM.



Testing includes visual inspection of plugs and cables

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P.17 First aid - emergencies

It may take a first aider several minutes to reach the scene of an accident or an accident might happen at a time when there are no first aiders in the building. During normal working hours a pager system is used in the Rowett building to obtain first aid dial 8686 from any telephone (Cards with further instruction are located by every telephone). First aid kits are available on all floors of the Rowett building. Lists of first aiders with contact details are posted in labs and corridors throughout the IMS and can be found on the safety web pages. The actions taken by those on the scene in the seconds and minutes immediately following an incident may be able to significantly limit the extent of the injuries suffered by a casualty.

Chemical contamination of the body

- 1) The first step must be to stop the chemical causing further damage to the body. The immediate inclination on being splashed with a chemical, or seeing someone else being splashed, might be to seek medical help. This could be a mistake. Medical help is required at a later stage to repair any damage that has been caused.
- 2) Apply large amounts of running water to the affected area for 10-15 minutes. This is the standard initial treatment for all chemical contamination. It must be commenced immediately. A delay of a few minutes can result in greatly increased damage to the body's tissues.
- 3) Anyone assisting a casualty should protect themselves with rubber gloves *etc.* Quickly and carefully brush off any dry chemical. Remove contaminated clothing and jewellery. After water irrigation for 10-15min, medical attention should be sought. The safety data sheet for the substance should accompany the casualty if taken to hospital.
- 4) Chemical contamination of the eyes should not occur if wearing appropriate eye protection. If it occurs, again apply running water for 10-15 minutes ensure that the waste water does not contaminate the unaffected eye. Use either eye wash fountains or flexible tubing fitted to a laboratory tap. The casualty should always then be taken to hospital.

Note: Running water is essential for treating chemical contamination of the eyes. Bottles of sterile water only have sufficient water for only a few seconds of treatment. If used, the casualty should be proceeding to a source of running water to continue the treatment when the bottle is empty.

- 5) Certain chemicals particularly require LARGE amounts of water.
 - Contamination with phenol - apply LARGE amounts of water, as insufficient water may increase absorption of the chemical.
 - Contamination with chemicals that ignite with water - still apply large amounts of water but be aware the casualty may panic.

Burns

To minimise the effect of burns, speed is essential. Immediately apply cold running water for at least 10 minutes. This can dramatically limit the tissue damage. Only seek medical attention after running water has been applied for this period. The same treatment applies to cold burns (*e.g.* liquid nitrogen).

Electrocution

If a colleague is electrocuted, do not attempt to release the victim until the power is shut off. If this is not possible, pull the victim away using thick (not thin disposable) rubber gloves, a coat or a rope to avoid becoming a victim yourself. If required, artificial respiration should be started at once. Send for an ambulance (9-999), stating it is electric shock with possible cardiac arrest.

Fire

If a colleague's clothing is alight, use a fire blanket to smother the flames. Lay the victim horizontal, so flames do not spread up the face. Wrap the blanket firmly around the affected area to completely smother the flames. Keep behind the blanket to avoid setting fire to yourself. If required, send for an ambulance (9-999).

First aid room

A first aid room, with a bed and sink, is located in the Rowett (2.043), IMS (room 1:56) and Polwarth (0.004). This may be used for recovery after minor injuries.

First aid boxes

First aid boxes are located in the corridors in the Rowett building and on laboratory floors of the IMS (levels 1, 2, 4 and 6) and Polwarth, and at strategic locations in other buildings. All Rowett First Aiders have First aid boxes.



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P.18 Fume cupboards

Fume cupboards are intended to keep harmful substances away from the person operating the fume cupboard and other laboratory users. But, the cupboard will only do this effectively if:

- it is used correctly; and
- it is maintained regularly.

Use of a fume cupboard

- 1) Fume cupboards are for experimental work and not storage areas. Storage interferes with the airflow within the cupboard, increasing the likelihood harmful substances escape from the cupboard into the laboratory. Also, if there were to be an accident, chemicals stored in the cupboard would increase the risks.

Do not undertake an experiment in a fume cupboard being used as a store.

- 2) Do not set up equipment near the front edge of the fume cupboard. This increases the likelihood of turbulent air flow at the front of the cupboard. Resultant “eddies” in the air stream greatly increases the risk of harmful substances escaping into the laboratory. Generally, equipment should be at least 150mm behind the sash.

However, take care equipment is not too far back. It must not obstruct the extract slot at the back of the cupboard or require the operator to put their head in the fume cupboard to operate the equipment!

- 3) Avoid unnecessary clutter. Large objects (safety screens, ovens, trays, etc) cause turbulence in the air being drawn into the cupboard. Turbulence can be minimised by raising large objects ~50 mm above the base of the cupboard with blocks.
- 4) Avoid rapid movements in near or within the fume cupboard. Sudden movement can disturb the airflow and allow harmful substances to escape.
- 5) Fume cupboards are NOT for work with micro-organisms. Use microbiological safety cabinets to work with hazardous micro-organisms.

Maintenance of fume cupboards

The best designed and engineered installation cease to perform effectively if not maintained on a regular basis. It is a legal requirement that all fume cupboards are maintained and that their performance is measured at least every 14 months. The Rowett TRM arranges for the maintenance of fume cupboards in the Rowett building and certificates of testing are recorded in Q-pulse system and a test sticker will be displayed on the equipment.

- 1) Maintenance of the fume cupboards used in the Rowett is undertaken by Estates. The Rowett TRM is responsible for ensuring that:
 - fume cupboards in the Rowett are inspected and maintained
 - face velocities are marked on the cupboards. (Face velocity is the speed at which air is drawn in through the front of the fume cupboard.)
 - any fume cupboard which is not inspected on schedule or which fails its inspection is taken out of use and maintenance sought.

- 2) Regular inspections:
 - staff from the Rowett will keep fume cupboards clear from clutter and, where necessary, carry out a thorough wash-down of the interior of the fume cupboard (including, if necessary, the area behind the baffle). This will be monitored during regular safety inspections.

- 3) Every 12-14 months contractors arranged by Estates will:
 - check the condition of services to the fume cupboard and the functioning of any alarms and controls;
 - carry out a face velocity test and record the face velocity and the date of measurement on a label on the outside of the fume cupboard;
 - carry out a detailed check on the condition of the fan;
 - check the stability and condition of the discharge stack;
 - check and clean duct work as is necessary;
 - check that the make up air into the laboratory is satisfactory; and
 - provide a certificate of inspection.

“Equipment out of Service” signs (QA Form138)

Whenever a cupboard is marked with a sign saying, “Equipment out of Service”, under no circumstances should the fume cupboard be used or anything placed in the fume cupboard. Maintenance of the fume extraction system is probably being undertaken and use of the cupboard will expose the maintenance worker to hazardous gases or fumes.

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P.19 Genetic modification work

We have procedures for the safe handling of microorganisms which includes **approval for the use** of all:

- genetically modified microorganisms;
- genetically modified animals;
- all wild-type microorganisms at containment level 2 or 3 unless approval is already held for work the genetically modified strain of the microorganism.

Work involving genetic modification in the Rowett must not commence until each project has been approved by the **Foresterhill Biological Safety Committee** (FBSC). The change in name of the Committee reflects the fact that the remit of FBSC has changed to cover work with wild-type microorganisms in addition to GM microorganisms (GMMs).

In addition to projects involving work with GMMs, you will need to notify the FBSC about projects with wild-type microorganisms at Containment Level 2 or Level 3.

For further information is at <http://www.abdn.ac.uk/ims/safety/biological-and-gm-safety.php>

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P.20 Glassware

Accidents.

Accidents with glassware are a common source of injury in the University.

Accidents with glassware can be very serious.

- 1) Check glassware is sound before use. Cracked or chipped glassware is dangerous and must be repaired or thrown away. If it is possible that it could be salvaged from the bin, carefully break the object into the bin to prevent reuse. Even scratches and star cracks can cause failure of glass in vacuum systems.
- 2) All glass must be properly supported. It is bad practice to clamp vessels of more than 500 ml by the neck alone.
- 3) NEVER pick up Winchesters by the neck, as the weight of the contents can be enough to shatter the bottle.
- 4) When carrying glass objects take care not to harm yourself or any other person. Always carry glass tubes vertically. Never carry glass objects in your pockets.
- 5) Always protect your hands with a cloth when cutting glass tube, or when inserting glass objects through bungs. A cork borer is a valuable aid to inserting glass through a bung. A lubricant such as glycerol or industrial alcohol will also help.
- 6) Take care when fitting pipettes into pipetting devices. The pipette should be grasped near the top and pressed gently but firmly into the device with a twisting motion and avoid leverage. Pipettes should be removed in a similar way.
- 7) Take care when putting flexible tubes, *e.g.* rubber or PVC tube on to glass objects. When removing flexible tubes from glass do not struggle with the stuck one, cut it off, flexible tube isn't expensive.
- 8) Fire polish the ends of glass tubes.
- 9) Never store glass on the floor.
- 10) Glass is often used for vacuum and occasionally under low positive pressures. To prevent bursting or collapse provide a protective screen or cage, or tape the apparatus with self-adhesive tape. Cling film is very useful in this respect. Never apply vacuum or pressure suddenly, as damage may result. Never use scratched, stained or damaged glassware. Always use the smallest suitable container, it is less likely to come to harm and with vacuum systems is easier to exhaust.
- 11) If heating glassware apply the heat slowly and ensure that the glassware is vented to avoid a pressure developing. Even glass coming from a cold room to the laboratory can develop pressure sufficient to cause damage.
- 12) Broken glass must be cleaned up at once. Avoid walking on areas of broken glass. Take care not to cut yourself – never collect glass with bare hands/fingers. Handle larger fragments with forceps. Use a dustpan and brush for smaller glass fragments (every lab should have one). Use a piece of plasticine for collecting

the smallest slivers of glass – and dispose of carefully. Take particular care with broken glass in sinks: wet, broken glass is almost invisible. If a liquid spill is involved in the accident, take care that the cleaning cloths do not collect broken glass. It is safest to dispose of all cloths used for clean up.

- 13) Each laboratory must have access to a clearly labelled broken glass bin, clearly separated from any general waste bins. Biologically contaminated glassware must be thoroughly disinfected before disposal in the bin.
- 14) Disposal. Place glassware in cardboard boxes marked “broken glass”. Tape the box well and sufficiently strong to support the weight of broken glass. For the Polwarth building, place in the blue compacting skip behind the building. Rowett and IMS staff should leave broken glass boxes in the cages within the rear entrance of IMS.

IMS glass and plasticware washing facility.

- 1) A dishwashing facility is available in room 1:21.
- 2) Ensure that all glassware and plastics are clearly marked with Rowett and lab number.
- 3) Washing up must have been disinfected, soaked in detergent and rinsed thoroughly before being taken to room 1:21. No corrosive or toxic residues must be left.
- 4) The dishwasher powder is Neodisher GK and is alkaline. The neutraliser is Neodisher 2 and is acid.
- 5) The staff who operate the wash-up facility, must be told if there are any special instructions (such as no soap wash).
- 6) Ensure that no glassware taken for washup is broken. Check for cracks as well and discard glassware that is unlikely to survive the washing process
- 7) Leave rinsed glassware and plastics in bins on sink area in 1:21. The washing can be collected from the tables in the centre of the room later that day. A piece of blue towel on top indicates that the glassware is clean.
- 8) Glass pipette washing, drying and sterilising services also operate. Pipettes must be disinfected and rinsed before taking to room 1:21 in an empty bucket.

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P.21 Highly flammable liquids (HFLs)

Highly flammable liquids (HFLs) should be treated carefully so:

- They do not become a source of fire
- They do not fuel an existing fire.

A HFL is a liquid with a **flash point** below 32°C. The flash point is the lowest temperature at which the liquid emits vapour at a concentration to form a combustible mixture with air. The flash points of some laboratory solvents used in the Rowett/IMS are:

ethanol	+12°C
methanol	+11°C
acetone	- 19°C
diethyl ether	- 45°C

As the flash points of all these liquids are below room temperature, they always constitute a major fire and explosion hazard. Acetone & diethylether have flash points below the temperatures of a refrigerator or freezer and therefore constitute explosion hazards even when in cold storage.

Bulk stocks

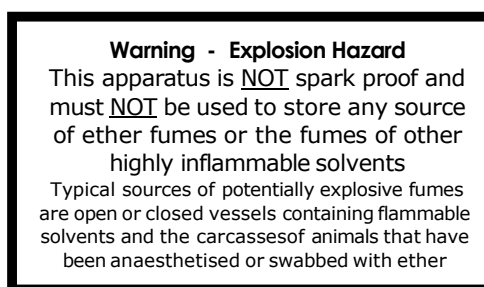
- 1) Bulk stocks of HFLs must be kept in the solvent store maintained by IMS stores and located outside the back entrance to the IMS building.
- 2) Entry to the store is restricted to keyholders.
- 3) Bottles of HFLs will only be issued at IMS stores to people with sealed bottle carriers capable of containing the contents of the bottle in event of spillage. The bottle carriers must be used to transport the HFLs to the laboratory.
- 4) Bottles to be filled at stores must have previous labels completely removed, a clear new label and the appropriate hazard warning symbol.

Laboratory stocks

- 1) The total volume of HFLs in any laboratory or room in the Rowett must be kept as low as possible and under no circumstances must it exceed 50 litres. 50-litres is set by legislation.
- 2) All HFLs in a laboratory must be stored in specially designed and approved fire-resisting cabinets. Ordinary metal storage cabinets are not acceptable. Cabinets should be located away from exits from the laboratory. Cabinets must be conspicuously marked with approved labels indicating they contain HFLs. Cabinets should be used only for solvents, never oxidants, acids, alkalis or other materials that could react with the solvents or corrode the cabinets. HFLs should not be stored on the open bench or in fume cupboards.
- 3) Bottles of HFLs temporarily removed from their storage cabinets should not be left on the open bench in direct sunlight.

Refrigerator storage

- 1) If HFLs must be kept in a refrigerator or freezer, it is essential to use a special refrigerator / freezer. It must be spark proofed and protected against an explosion. Even a very small amount of HFL in an ordinary refrigerator or freezer can create an explosive atmosphere that can then be ignited by a very low energy spark (*e.g.* from a thermostat). The consequences can be devastating. It is very likely that the resulting explosion will, at the very least, completely destroy the laboratory containing the refrigerator or freezer. Even in a protected refrigerator, the HFLs must be kept in closed containers impervious to the solvent concerned. Many plastics are not suitable.
- 2) All refrigerators, freezers and cold rooms which are not spark proofed must be labelled with a sign indicating that they are not suitable for storage of any HFL (in either open or closed containers). Signs are available from IMS Stores. Even if the flash point of the liquid is above that of the working temperature inside the refrigerator, storage is still not permitted. If the cooling system were to fail, the temperature could rise above the flash point and an explosive atmosphere could result.



Empty bottles

Empty bottles that once contained HFLs should be handled and stored as carefully as full bottles as they may contain explosive vapours.

Work with Highly Flammable Liquids

- 1) Those working with HFLs must be aware of the flash points of the liquids and must take care to exclude ignition sources from the work area. The risk assessment for the work must address how this will be done.
- 2) In deciding what might be a possible source of ignition, note must be taken of the **autoignition temperature** of the HFL. The autoignition temperature is the minimum temperature to initiate combustion. It is not only sparks and naked flames that can be a source of ignition. If the vapour of the HFL comes into contact with a surface at a temperature in excess of the autoignition temperature, the vapour can ignite (*e.g.* the autoignition temperatures of diethyl ether is 160 °C).

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P.22 Lasers

The risk of retinal damage from laser light, even from reflected beams, is serious. Lasers are classified according to their power output. Class I lasers are not powerful enough to harm the eye. Wherever possible the beam should be enclosed. In the Rowett/IMS, they are used as pointers and in flow cytometry and confocal microscopy. The full list of equipment containing lasers in the Rowett/IMS is outlined in the Laser Safety Local Rules (an up to date copy can be found in each room that contains laser equipment). For any other use of lasers, you should first consult with the IMS Laser Protection Supervisor Dr Debbie Wilkinson (ext. 7422) or the University Laser Protection Adviser, Dr Stephen McCallum (Tel: 76-53109).

1) Laser pointers

The University guidance on the purchase of laser pointers can be found at <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#lasers> . Any laser pointer purchased should be either Class I or Class II. The human aversion response of the eye should ensure that such lasers do not damage the eye unless viewed through a focussing system. Some people, however, may not respond as rapidly as anticipated or may be able to choose to overcome the blink response.

- Pointers must never be aimed directly at anyone
- Never look directly at a pointer to see if it is working
- If it fails to switch off, be placed in a light-tight enclosure and the incident brought to the attention of an Rowett Safety Coordinator
- Anyone with queries should contact Dr Steve McCallum, Tel: 76-53109.

2) Equipment with lasers (Confocal laser scanning microscopes/FACS)

The equipment with lasers in the Rowett do not pose a risk to users when operated normally. There must be adequate ventilation for cooling of the laser head. Users should check that fans are operating. The systems have been configured by the suppliers to comply with safety regulations. Most of the lasers within the machines are class 3B (3mW to 200mW) but the machines have a number of safety interlocks which will protect the user from accidental exposure to the beam. Potentially lethal voltages can occur in the laser head and control box. Thus, no attempts should be made to open any of these. All users are expected to read the Laser Safety Local Rules which can be found in each room that contains laser equipment. Any questions or concerns about the safety of the equipment should be communicated to the Microscopy Facility Manager (Mr Kevin Mackenzie ext. 7447) or the IMS Laser Protection Supervisor (Dr Debbie Wilkinson ext. 7422).

Although lasers have the potential to cause damage, most accidents involving lasers are caused by more conventional hazards. High voltage electricity can give rise to fire or explosion hazards and, under certain circumstances, can generate X-rays.

If you have, or believe you have, received an exposure to laser radiation in excess of permitted levels, then you must immediately follow the Emergency Plan that is outlined in the Laser Safety Local Rules. If an accident or incident has occurred, the laser or laser system should be switched off, isolated and remain undisturbed until the University Laser Protection Adviser undertakes a full investigation.



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P.23 Lone working and out of hours working

Lone working is working without anyone else within calling distance that would be able to provide assistance if something went wrong. Lone working can occur during the day – *e.g.* during lunch hours, during holiday periods, *etc.* as well as at evenings and weekends. Only low risk laboratory work should be undertaken by lone workers and it is the responsibility of PIs to make sure that all members of their group are aware of this. Exactly what types of lab work that can and cannot be done by a lone worker must be established by the PI. The person within calling distance of a lab worker needs to be capable of providing assistance in an emergency. It is the risk of the laboratory task alone that must be assessed and not the competence or the experience of the lone worker. Risk assessments for the task to be undertaken should be carried out and reviewed regularly. Further guidance is provided in the University Lone working policy and guidance (issued 04 October 2016; <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#lone-working>)

Out of hours working refers to work outside the normal working hours, times at which supervisory staff may not be available for advice or assistance. For the purpose of this procedure, we will use the following as normal hours: 7am to 7pm, Monday to Friday, except bank holidays and at weekends. Less experienced workers may encounter difficulties when working out of hours and, without supervisory advice, they may push on with work and create a situation with unacceptable safety risks. PIs must review the training and competence of those undertaking particular tasks to decide whether they can be allowed to carry out such tasks out of hours. The procedure for lone working will also need to be applied if there is nobody within calling distance.

This procedure is designed to:

- Raise the awareness of the dangers of lone working
- Distinguish between lone working and out of hours working
- Inform staff of permissions required for lone working and out of hours working
- Provide guidance for out of hours working.

Lone working

- 1) All laboratory workers must be informed of the additional hazards associated with lone working and of its distinction from out of hours working. Lone working can take place out of hours and also during the working day. Someone working in the evening might be a lone worker but, equally, might not be.
- 2) Only low risk laboratory work may be undertaken by lone workers and PIs should define what tasks may be undertaken by lone workers. It is the task that needs to be assessed and not the competence or experience of the lone worker. Experienced workers can have accidents too. Consider what could go wrong and whether the presence of someone else within calling distance could make a difference to the outcome; *e.g.* if there were a spillage of a chemical onto the lab worker, someone else would be able to help with the emergency response – likewise if there were a fire.

- 3) In most laboratories lone working will be the exception rather than usual practice.
- 4) Postgraduate and Honours students must be alerted by their supervisors to the situations in which lone working might arise during normal hours and outwith normal hours.
- 5) Lone working by students should only be allowed only for low risk tasks that have been authorised by supervisor/PI.
- 6) Laboratory workers should identify that other people are working within calling distance. They should continue to check on this situation throughout the day or night. If this is not the case, then they need to be aware that they are a lone worker. If not permitted to do the tasks as a lone worker, then they must find another person or cease their work until they are no longer a loneworker.
- 7) A person in calling distance needs to be able to assist in an emergency. A friend who is unfamiliar with laboratory work is unlikely to be suitable leaving you effectively as a lone worker.

Out of hours working

- 1) You must have explicit permission from your supervisor for out of hours working. The experience and competence of those undertaking the work is the key factor in deciding if they can carry out a particular task out of hours.
- 2) At the same time as giving permission for out of hours working, supervisors should indicate whether there must be someone else present within calling distance to avoid lone working.
- 3) If working out of hours, let your supervisor or someone else know when and where you are working; exchange your name and telephone contact number; phone or text to indicate when you leave. The use of the SafeZone app is recommended for both lone working and out-of-hours working.
- 4) Undergraduate students are not allowed to work out of hours unless supervised.

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P.24 Manual handling

Back injury resulting from manual handling is a common cause of lost time accidents. Injury to the lower back, caused by a momentary lapse of good practice, may never

recover fully and can be prone to relapse. It is not only injuries to the back which can result from manual handling operations. Cuts, bruising of hands and feet are injuries which can occur when manual handling is not done correctly.

1) Members of the Rowett with supervisory responsibilities must ensure that people under their control are not expected to carry out manual handling operations which are likely to cause injuries.

2) Before attempting to lift anything, size up the job. Do not hesitate to seek help with heavy or awkwardly shaped loads. Always look at the possibility of moving the load in an easier way (*e.g.* by using a trolley or some other form of mechanical assistance).

3) In particular, care should be taken when office/laboratory moves are undertaken: hiring external contractors can avoid unnecessary injury.

4) Anyone with any doubts about their ability to lift or carry a particular item, should discuss it with their immediate supervisor. It will usually be possible to work out a different way to move the load.

5) The University has run a manual handling training course for those whose jobs involve lifting and carrying. Supervisors should encourage those who may benefit to attend such courses.

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P.25 Microbiological safety cabinets

Types of microbiological safety cabinets

Health, Safety and Wellbeing legislation requires a microbiological safety cabinet to be used of work at laboratory containment levels 2, 3 or 4 is likely to give rise to infectious aerosols. (Note: There are no facilities for containment level 4 in the University.)

There is a British Standard that defines three different types of safety cabinet. These are called Class I, Class II, and Class III. Note: The class numbers do not have any relationship to containment level numbers or to biological agent hazard group numbers.

Class I microbiological safety cabinets are designed to provide operator protection by maintaining an inward flow of air past the operator and over the work surface inside the cabinet. As the incoming air is unfiltered, this type of cabinet does not provide product protection. There is a risk that airborne organisms in the working environment, for example, will contaminate cell cultures. Class 1 cabinets are generally suitable for work at laboratory containment levels 2 or 3.

Class II cabinets, on the other hand, offer protection to both the operator and the product. The inflow of air at the front of the cabinet, which is filtered before circulation within it, discourages emission of airborne particles generated by the work while the downflow of filtered air over the working surface protects the work. A Class II cabinet is potentially more susceptible to disruption of its airflow pattern than a Class I cabinet. If however it can be shown that it achieves an operator protection factor equivalent to a Class I cabinet, it can be used at laboratory containment level 2, and under exceptional circumstances, at containment level 3.

Class III cabinets are totally enclosed units and can provide the maximum protection for the operator, the environment and the work. In this model, both incoming and outgoing air is filtered. Access to the interior of a Class III cabinet is gained by use of arm-length gloves attached to ports in the front panel of the unit. Use of Class III cabinets is generally confined to work with pathogens in Hazard Group 4 but this model may also be appropriate for other work where the equipment or procedures used may present a risk of vigorous aerosol generation.

Important Note: “Laminar flow” cabinets are designed only to provide product or sample protection and provide no protection at all to the operator.

Maintenance of microbiological safety cabinets

After installation, a microbiological safety cabinet will continue to meet the requirements of the relevant British Standard only if it is maintained in accordance with the standard. Maintenance tests should be carried out at least annually.

- 1) The Rowett TRM is responsible for ensuring that microbiological safety cabinets are inspected and maintained and that records are kept to show this. They will arrange for the microbiological safety cabinets to be inspected by a third party contractor at least every 6 months. The Rowett TRM and person responsible for the room will ensure that any cabinet which is not inspected on schedule or which fails inspection is taken out of use.
- 2) If the cabinet is used for work at laboratory containment levels 2 or 3, the inspection must include the measurement of operator protection factor at least every 12 months.
- 3) A certificate of inspection will be obtained from the contractor and held in Q-pulse. The date of inspection and confirmation that the cabinet has passed inspection will be recorded on a label on the outside of the microbiological safety cabinet.

Fumigation of microbiological safety cabinets

Microbiological safety cabinets used for work at containment level 2 or above must be fumigated before any servicing or maintenance work that requires access to the filters is carried out.

Contractors usually carry out Service and maintenance. The current servicing contractor, Clean Air Containment Services, must receive from the Rowett a written declaration for each safety cabinet before beginning servicing or maintenance work. The declaration must state either that the safety cabinet has been fumigated **or** that the cabinet has been used only for sample protection and not for the protection of the operator from potentially harmful biological agents **or** that the cabinet has been used for potentially harmful biological agents and any work that involves access to the filter must not be carried out until the cabinet has been fumigated.

The British Standard provides guidance on fumigation. A responsible person who has adequate knowledge of the procedure and the precautions to be followed should carry out fumigation of cabinets. A warning notice that the cabinet is being fumigated should be displayed.

Decontamination of the whole cabinet, including filters, fan unit and work surfaces can be achieved by fumigation with formaldehyde vapour. For cabinets that recirculate air to the room, the system of fumigation used must ensure that personnel are not exposed to levels of gases above the relevant occupational exposure limits. In the Rowett, contact the TRM for advice on the fumigation of Category 2 Safety cabinets.

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P.26 Microwave ovens

No food/drinks should be heated in laboratory ovens and no laboratory use should be made of ovens in staff lounge area. The main dangers of using microwave ovens are:

- Burns from superheated liquids
- Fire arising from thin pieces of metal (*e.g.* aluminium foil)
- Explosions from screw-capped bottles and eggs.

Superheated liquids

Water doesn't always boil when it is heated above its normal boiling temperature (100 °C). Something must trigger the formation of steam bubbles, a process known as "nucleation." If there is no nucleation, there will be no boiling and therefore no effective limit to how hot the water can become. In a microwave oven, nucleation usually occurs at defects in the surfaces of cooking vessels. Since glass containers or smooth cups have few or no such defects there is the possibility that the water will superheat. If superheated water escapes the vessel it can cause serious eye injuries or third-degree burns.

The risks can be minimised: by not overcooking liquids in the microwave oven; by allowing the liquid to cool before removing it from the oven; and by being cautious when you first disturb liquids that have been cooked in a microwave oven.

To avoid burns from superheated liquids: keep the vessel away from your face and body until you're sure it's safe and never look over the top of the container. You can ensure that it's safe by deliberately nucleating the liquid. Holding the flask in a heat-resistant glove, and keeping it away from your face, gently swirl the liquid in the container. With large quantities of potentially superheated water (more than 1 cup, or 100 ml) do not try to nucleate boiling until you've waited for it to cool down.

Microwave ovens can heat material so quickly that, even though the container cap may be loosened to accommodate expansion, the cap can seat upwards against the threads and the container can explode. Screw-caps should always be REMOVED from containers which are being microwaved. If there are concerns about preserving the sterility of the contents, the screw-caps may be replaced with soft foam plugs or similar which will work their way out gently under pressure.

Metals in microwave ovens

Microwaves cause currents to flow in metals. With thin pieces, the currents may heat the metal hot enough to cause a fire. Metallic decorations on fine porcelain can become hot enough to damage the porcelain. The currents flowing in the metal can also produce sparks, particularly at sharp points, and these sparks can cause fires. In general, smooth and thick metallic objects such as spoons aren't a problem, but sharp or thin metallic objects such as pins or metal twist-ties are.

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P.27 Needle-stick injuries

- If the needle is clean and unused all that is necessary is to encourage bleeding of the wound.
- If the needle has been used and come into contact with potentially infectious or radioactive material, bleeding should be encouraged and medical attention sought at the Accident and Emergency Department at the Hospital. Following initial treatment at the hospital, any follow up treatment required should be arranged with the Occupational Health Provider by booking via HR.
- If the injury involves blood from another person, you should go to the Accident and Emergency Department at the hospital immediately to have a blood sample tested and, where possible, a sample of blood from the source person should also be tested.
- If the injury involves toxic chemicals then, after immediate treatment, you should seek attention at Accident and Emergency. Take with you information regarding the toxic agents.
- A University accident report form should be completed within 48 hours (<http://www.abdn.ac.uk/safety/general/accidents/>) and copies sent to the local safety coordinator.

Precautions

The likelihood of needle-stick injury should be minimised by:

- prohibiting the re-sheathing of needles
- discarding used sharps immediately into sharps container
- discarding needle and syringe as a complete unit

Immediate treatment following exposure to blood:

- Gently squeeze wound (do not suck area)
- Wash affected area with soap and water (do not scrub)
- Rinse mucous membranes with warm water (do not swallow water)

All laboratory workers working with human body fluids should receive appropriate immunisations. Supervisors should ensure that staff or students are aware of the risk and encourage vaccination. Vaccination for hepatitis B is strongly recommended for those working with unscreened blood and tissue. A minimum of 6 weeks should be allowed prior to commencement of work and particular attention of this should be given to undergraduate honours projects. Vaccination for hepatitis A, polio, typhoid and tetanus is strongly recommended for those who will be coming into contact with human waste products and/or untreated water.

Vaccination should be arranged using the following procedure.

New staff/students/or current staff who's role has changed

After meeting with the Biological Safety Adviser who will advise on the vaccination requirements, new staff/students should get their line manager/PI to contact

HR who will arrange an appointment with the Occupational Health Provider.

The line manager/PI should provide OH with the following information

1. Vaccination required
2. Name of person requiring vaccination
3. Date of birth of person requiring vaccination
4. Email address of person requiring vaccination

OH will then contact the person requiring the vaccination directly to arrange an appointment. Any follow ups required will be advised directly by OH.

Please inform the Biological Safety Adviser (Karen Scott, Ext 8730, k.scott@abdn.ac.uk) of the appointment and when the vaccinations have taken place so that your records can be updated.

For further information see [Immunisation/vaccination](#)

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P.28 Occupational Health Service

The University employ an Occupational Health Service which provides specialist advice and assistance to University staff. This includes the effect of the working environment on employees' health, and also how employees health issues impact their ability to carry out their duties at work.

Further details can be found at: <http://www.abdn.ac.uk/staffnet/working-here/occupational-health-1189.php>

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P.29 Offices, libraries and corridors

The following practices should be instinctive to all staff and students in the Rowett. It is important that everyone ensures that they follow these guidelines to make buildings a safer place to work in.

- 1) Machines:
 - only operate these according to the manufacturer's instructions
 - ask an experienced operator to show you how to use them
 - avoid getting long-hair/clothing caught in machines

- do not remove panels or adjust electrical fittings
 - follow handling instructions provided by the manufacturer when handling photocopier and printer chemicals.
- 2) Lighting facilities and ventilation should be adequate to maintain a comfortable working environment.
 - 3) Seating arrangements, keyboard positions and VDU location should be adapted to meet the needs of an individual office worker (see [P.13 Computer workstations](#)).
 - 4) Electric leads should not trail over benches or floors such that they can cause an accident. Multiple adaptors should not be used: arrange for extra power sockets to be fitted through Estates.
 - 5) All appliances should be switched off at night, except for items such as fridges and freezers. The latter should be labelled with: 'NAME OF ITEM' and 'OUT OF HOURS CONTACTS'.
 - 6) When carrying files/packages ensure that your vision is not obstructed. If so use a trolley. This is especially important when carrying buckets with glassware.
 - 7) Filing cabinets:
 - Ensure sufficient weight in bottom so that the top drawer does not cause the cabinet to fall over.
 - Do not leave drawers open as the corners can cause injury.
 - 8) Do not stand on chairs or stools. Use a kick stools or a ladder. Try not to store things at great heights (*i.e.* over 2 metres).
 - 9) Keep doorways clear of all items.
 - 10) Do not obstruct corridors, doorways and staircases (either with people or objects).
 - 11) Do not use fire appliances as doorstops.
 - 12) Do not leave fire doors open.
 - 13) Do not run in any area of the Rowett.
 - 14) Office and non-laboratory staff should be aware that laboratories are hazardous areas. Never touch bench surfaces, apparatus or chemicals in laboratory areas unless permitted by senior staff of the laboratory.
 - 15) Lock doors and switch off lights at night, unless occupied.
 - 16) Strip light bulbs that fail must be replaced by qualified electricians and the spent bulbs disposed of by Estates.
 - 17) If chemical or other spills occur in corridors or stairways, ensure that others entering these areas are aware of increased danger and evacuate the area if necessary (see [section 11 - 'Spillages'](#)).
 - 18) ZIP taps provide boiling water in the Rowett. Kettles should not normally be used. Permission must be obtained from the TRM to use a kettle in the Rowett.

- 19) Mail: On receipt of any suspicious package or of a telephone bomb threat, the Estates section must be informed immediately and they will assist in the implementation of an appropriate course of action (ext. 3939).



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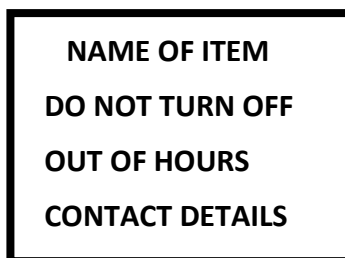
P.30 Out of hours running of unattended experiments and equipment

Equipment left running overnight and at weekends

For safe operation and to keep Security staff fully informed, the following procedure must be used for equipment running overnight (see also procedure [P.23 – ‘Lone working’](#)).

a) Permanent equipment

The power and water supplies of fridges, freezers, ice makers and water stills should be clearly labelled with permanent labels next to the control switch saying:



b) Equipment not normally used out of hours

For example, centrifuges, fraction collectors, electrophoresis equipment. Check any equipment that is to be left unattended for signs of damage. Cooling water systems need effective jubilee clips and sound tubing. Ensure that any waste lines for water are secured into the drain in case the pressure increases overnight.

The equipment must be labelled with a yellow running permit, available from Lab coordinators.

Persons responsible for the equipment must ensure that they are available to answer any emergency call during the period of the experiment.

Students must get permission from their supervisor before running any equipment unattended outside normal working hours. The supervisor should discuss with the student the following considerations before granting permission.

- Has the experiment been run attended for at least one hour under the exact conditions in which it will be run unattended?
- Are water connections secure so as to prevent flooding?
- What will happen if services such as cooling water, electricity or compressed air fail? Has the experiment been set up in a way that will prevent dangerous conditions developing following such a failure?
- Will the experiment present a danger to those who might come into the laboratory outside normal working hours (*e.g.* cleaning and security staff)?

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P.31 Personal protective equipment

Eye Protection

1. Eye protection must be worn in all laboratories – exemptions are only allowed if approved by the Rowett H&S committee – see Q Pulse Form 467 for approved exemptions
- 2) Normal spectacles are not an effective or acceptable form of eye protection.
- 3) Where the risk of injury to the eyes or face skin is high, goggles or full face visors will be required. Full face visors are essential when dispensing or handling cryogenic fluids. Droplets of caustic/heated solutions will easily and quickly cause facial scars. It is too late to reach for face protection when they have been splashed.
- 4) UV-resistant visors must be used when viewing DNA gels with ultraviolet light (see [P.35](#))



Ear Protection

- 1) Ear protection should be worn whenever using prolonged periods of ultrasonication. For most uses, containment within a fume cupboard usually provides sufficient protection.
- 2) When assessing the risk from sonication the protection of others in the laboratory area must be considered.
- 3) Where extended periods of sonication are required, sonication equipment must be contained in an isolation box.

Respiratory Protection

No procedures in the Rowett require the use of respiratory protective equipment. Laboratory procedures and experimental work should normally be designed to keep airborne contaminants such as dust, toxic gases and fumes away from people. If someone needs to wear a facemask, they must ask themselves if it is also unsafe for everyone else in the same room.

Respiratory protective equipment may be required in an emergency (e.g. [Section 11 - 'Spillages'](#) or failure of normal controls).

Lab coats/Protective coats

- 1) Laboratory coats are intended to collect small spillages and to protect the person and their clothing. They must be Howie style (side-fastening) and always be worn fastened up in laboratory areas.

- 2) The contamination that accumulates on a lab coat should remain in the laboratory and not be transported around the building. **The lab coat should not be taken into libraries, write up areas or places for eating and drinking.** Staff should not enter the Rowett atrium in lab coats. A failure to follow this very basic precaution can result in others in the building (as well as the wearer) being exposed to the contamination.

Note: Anyone who does not wear a lab coat in the laboratory will almost certainly carry contaminants out of the laboratory on their clothing.

- 3) Laboratory coats fastened by press studs are much better than those fastened by buttons as the former can be removed much more quickly in event of a spillage on the coat.
- 4) If there is a likelihood of splashing liquids, a thick rubber or plastic apron should be worn over the normal lab coat.
- 5) Should those working with biological agents find their lab coat becomes contaminated with biological agents, the coat should be put in an autoclave bag and autoclaved.
- 6) When laboratory coats are to be laundered, all pockets must be checked and their contents emptied before being sent to the laundry.

Hand protection

Gloves are essential in laboratories and should be worn whenever there is a likelihood of the hand coming into contact with substances that could damage the skin or with toxic substances that could be absorbed through the skin (or through cuts and abrasions on the skin). Cuts and abrasions on hands should be sealed with plasters before donning gloves, in case the gloves split or skin contamination occurs when removing gloves. As a general rule, nitrile or neoprene gloves are recommended, but check manufacturer guidance if uncertain.

Catalogues of gloves suitable for laboratory use contain a very large range of different gloves made of different materials. A large range is essential as materials used have differing resistances to the different types of chemicals used in the laboratory. Some chemicals will go through the material of some gloves almost immediately. It is vital to pick the correct glove to provide the right level of protection against the substances with which you are working.

Before using a glove to protect against a particular chemical it is essential to refer to the specification produced by the manufacturer of that glove. Many gloves will burn readily. It is preferable not to wear them near naked flames. If they must be worn, great care is needed to keep them clear of the flame.

When wearing gloves do not touch anything that someone else without gloves might touch (*e.g.* telephone, computer keyboard, door handle).

Know how to remove disposable gloves without touching contaminated surfaces with your hands by turning the gloves inside out.

Latex gloves and allergic reactions

In the past, powdered latex gloves have been used in laboratories. Studies have now established that the use of cheap powdered latex gloves substantially increases the risk of the wearer developing an allergy to the latex proteins in the gloves. Once such an allergy develops, there is usually no cure. Symptoms can include inflammation of the skin and asthma. Latex gloves should no longer be used in Rowett Laboratories

Hand protection handling ethidium bromide

Nitrile gloves must be used with ethidium bromide because they are more robust and less likely to develop pin holes than other glove types.

Remember to follow proper procedures when using gel documentation equipment and ethidium bromide gels. Gloved hands that have handled ethidium bromide should not then be used to touch any instrumentation, computer mouse, light switch, door handle *etc.* Use a "one handed approach" where one gloved hand manipulates the gel while the other, also gloved but **clean**, hand is used to touch the mouse, instrument, etc., or use a "double gloved approach" where the gloves used to handle the gel are removed leaving clean gloves with which you can handle other things in the room. If using the double gloved approach make sure you remove the second glove on leaving the room to ensure no possibility of contaminating doors in the corridor.

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P.32 Personal safety entering/leaving buildings

Staff and students should take precautions for their security and the security of University buildings that they work in, including:

- Parking your car in open well-lit locations.
- Phone security (ext. 3939) if you have any suspicion about persons around buildings.
- Wear your identification badge and do not let anyone into a building if they do not have identification.

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P.33 Radioisotope use

The use of radioisotopes is strictly controlled. The rules governing this use and the procedures to be used are laid out in the Ionising Radiation Safety Arrangements and Rowett Local Rules for Ionising Radiation (both at <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#ionising-radiation> and must be adhered to). They are overseen by the Radiation Protection Advisor, **Dr Stephen McCallum**, and the Radiation Protection Supervisors - Lead RPS **Dana Wilson** and Deputy RPS **Lynn Thomson**.

Please be aware:

- Experiments involving radioactive materials must only be carried out by suitably trained staff/students that are approved and registered as radioisotope users. A member of staff or student wishing to undertake work with unsealed radioactive substances **must** first have spoken to the RPS and completed the basic radiation safety course, available online at <https://www.abdn.ac.uk/staffnet/working-here/resources-5988.php#ionising-radiation>. Previous experience or training elsewhere is **not** sufficient. Once the prospective user has confirmation that they have passed the online course and has had local lab training in the radioisotope procedures, they can apply for registration on the Isoinventory system (<http://isoinventory.abdn.ac.uk/>)
- The principal investigator must ensure that all staff or students working on the experiment are proficient in basic laboratory techniques, and in the protocols required for the experiments with isotope, before they start manipulation of radioactive substances unsupervised. It is important that all staff involved in this work are suitably trained in carrying out contamination monitoring.
- Work with radioactive materials should only be carried out in designated areas. Rowett Room 4.030 (restricted access) is for storage and dispensing of radioisotope stocks and high activity work.
- Access to radiation areas should be restricted to those who have been trained and are directly involved in the experiment. Only trained, registered workers may handle radioactive isotope.
- Principal Investigators are responsible for ensuring that all University and local rules regarding use of radioisotopes within their laboratories are adhered to.
- Experiments should be carefully planned and should only take place if no other equivalent experiment which does not involve radioactive substances exists. We are obliged by SEPA to ensure that any experiments that require the use of an isotope utilises the minimum quantity of radioactivity that will ensure a viable result. Consequently ALL isotope users must have **written** evidence that they are complying with this requirement.

- The amount of a radioisotope that can be held in the Rowett/IMS is limited. To place an order for an unsealed radioisotope, you must speak to an RPS as only they are allowed to place orders for radioisotopes in the Rowett. Users should limit the amounts of radioactive stock solutions kept within the Rowett/IMS to that required in the immediate future. Stocks stored for several years, even those containing isotopes with long half-lives, are unlikely to retain any biological activity.
- Consideration should always be given to using the least hazardous radionuclide for example ^{33}P should be used in preference to ^{32}P .
- Contamination monitoring should take place **before** starting work and **after** the work is completed and for the wider lab area on a 2-weekly basis. Procedures for carrying out and recording contamination monitoring are explained in the Rowett local rules for ionising radiation section 11, appendix 1. If significant contamination is found, then decontaminate following the advised procedure.
- All radioisotopes users must ensure that storage, usage and disposal of radioisotopes is recorded promptly on Isoinventory (<http://isoinventory.abdn.ac.uk/>). In the case of disposal of radioisotopes to drain, this disposal should be entered on Isoinventory immediately **before** the disposal is made. This is to ensure that we do not exceed the monthly discharge limits as determined by SEPA.
- From time to time it may be necessary to decommission labs or areas in labs no longer required for isotope work. When this is done it is vital that comprehensive monitoring is performed to ensure that all working surfaces, floors, equipment, drains and flow hood are free of radioactive contamination. A form must be completed to document these checks and is available from the lead RPS. You are advised to speak to Stephen McCallum and the lead RPS before commencing decommissioning of any lab in the Rowett.

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P.34 Refrigerators, freezers and cold rooms

- 1) Standard refrigerators and freezers are not equipped with spark-proofed equipment and must never be used to store highly flammable liquids. This applies even when these liquids are in small quantities and/or in sealed containers.
- 2) Warning signs must be posted on the door indicating whether a fridge/freezer or cold room is suitable for storage of highly flammable liquids. Signs are available from IMS Stores.

Warning – Explosion hazard

This apparatus is NOT spark proof and must NOT be used to store any source of either fumes or the fumes of other highly inflammable solvents

Typical sources of potentially explosive fumes are open or closed vessels containing flammable solvents and the carcasses of animals that have been anaesthetised or swabbed with ether

- 3) Before storing any material in a refrigerator, it must be clearly labelled with the owner's name, the contents, hazard information and the date on which it was stored. Labels must be firmly fixed so that they are not lost or obscured during storage. In the case of items that can become reactive at room temperature, precautions must be taken against interruption of the electricity supply.
- 4) Electrical equipment used in a cold room must be designed for that purpose. Equipment should be labelled clearly with the operator's name, lab number and telephone number.
- 5) Cardboard boxes for storage should be avoided- they get wet and harbour mould growth. Culture media should be stored in designated cold rooms.
- 6) Close the door of the cold room whenever you enter and exit; to avoid temperature fluctuations and condensation build up.

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P.35 Ultra-violet radiation

Ultra-violet (UV) radiation lies between the wavelengths 100-400 nm. The action of UV light on the eye is acute and the human eye cannot detect wavelengths below 380 nm. Conjunctivitis results 3-12 hours post exposure and lasts for several days. Skin damage and even burns can be caused by exposure. Suitable eye protection must always be worn whenever there is a possibility of direct exposure to UV radiation. Sunglasses and ordinary prescription glasses do not provide adequate protection for eyes. Protective clothing (*i.e.* laboratory coat) and gloves should be worn to protect from skin exposure.

In the Rowett, UV lights are used in:

- visualisation of DNA gels. UV light boxes should be used in dark rooms in which the door can be locked to prevent others entering while UV radiation is being emitted. UV radiation can cause the production of ozone. Adequate ventilation of the dark room is necessary to ensure that exposure to toxic ozone is kept below the statutory exposure limit for the gas.
- microbiological safety cabinets. The UV light must always be turned off before starting work in these cabinets. If the UV light fails do not try to replace it. Let a qualified service engineer or electrician replace the bulb. Release of mercury vapour upon stress destruction of high pressure mercury vapour lamps poses an additional safety hazard. Spent light bulbs must be disposed of by contacting the Rowett Lead Safety Coordinator (ext. 8752; dana.wilson@abdn.ac.uk).
- spectrophotometers and fluorescent microscopes. In most microscopes and spectrophotometers, the deuterium UV light source is shielded from emitting radiation from the equipment. The only real danger is if the power is turned on with the cover removed. In no cases must this be done. If a deuterium or any other bulb is to be replaced, the power must first be turned off and unplugged.

Warning signs must be used at every UV installation.

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P.36 Vacuum systems

- 1) The danger of implosion in a vacuum system depends on the absolute pressure difference between the inside and the outside of the system. This means that a water-pump vacuum is as dangerous as a high vacuum of similar dimensions and the same precautions must be taken.
- 2) Eye protection (goggles or safety visor) is mandatory when operating glass vacuum apparatus.
- 3) When assembling vacuum equipment, examine it for stresses and strains, both before and after filling. Use metal or plastic tubing wherever possible and include flexible couplings
- 4) Wide bore tubing, bulbs and items up to 1 litre capacity should be strapped with tape and sprayed with PVC. Larger items should be encased in solid, metal mesh cages.
- 5) Vacuum pumps must be serviced regularly.
- 6) Ensure that rubber bungs are large enough to avoid being sucked into an evacuated vessel.
- 7) Ensure that stopcocks are lubricated. Always operate stopcocks slowly, while supporting the barrel at the same time, and never try to force them open.

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P.37 Power failure - Action to be taken by building occupants

Following a power failure in a University building, emergency lighting powered from batteries will switch on automatically. This should last for at least one hour. Its purpose is to illuminate exit routes from the building. It is not there to enable building occupants to remain in the building and continue working.

If there is a power failure during hours of darkness:

Building occupants should immediately vacate the building;

If there is a power failure during daylight hours:

- 1) Building occupants should immediately vacate any parts of the building which are not illuminated either by emergency lighting or by natural daylight;
- 2) If power is not restored within five minutes, building occupants should vacate
 - any parts of the building which are illuminated by emergency lighting only (*i.e.* where there is no illumination from natural daylight) and
 - any parts of the building where the exit routes are illuminated only with emergency lighting (*i.e.* corridors and stairwells without windows);
- 3) If they wish to do so, building occupants may remain in the parts of buildings which are illuminated by natural light and which are served by exit routes which are also illuminated by natural light.

Before leaving, building occupants should disconnect from the electricity supply any equipment which was in use prior to the power failure.

Note: Fire alarm systems are fitted with back up batteries which will enable the fire detection and alarm systems to continue to operate until at least the end of the working day.

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Appendix 1

Incompatible chemicals with reactive hazards

A wide variety of chemicals react dangerously when mixed with certain other materials. Some of the more widely used incompatible chemicals likely to be used in the Rowett/IMS are listed below, but the absence of a chemical from this list should not be taken to indicate that it is safe to mix or store it with any other chemical. Incompatible chemicals must be stored separately.

Substance	Incompatible substances
Alkali and alkaline earth metals together with magnesium, and powdered aluminium.	Carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons, waste.
Acetic acid	Chromic acid, nitric acid, ethylene, glycol, perchloric acid, peroxides and permanganates.
Acetone	Concentrated nitric and sulphuric acid mixtures. Chloroform + base.
Acetylene	Chlorine, bromine, fluorine, copper, silver and mercury.
Ammonia (anhydrous)	Mercury, chlorine, calcium hypochlorite, iodine, bromine, hydrogen fluoride.
Ammonium nitrate	Acetic acid, metal powders, flammable liquids, chlorates, nitrites, sulphur, finely divided organics or combustibles.
Azides	Acids.
Bromine	Ammonia, acetylene, butadiene, butane and other petroleum gases, sodium carbide, turpentine, benzene, and finely divided metals.
Calcium oxide	Water.
Carbon, activated	Calcium hypochlorite.
Chlorates	Ammonium salts, acids, metal powders, sulphur, finely divided organics or combustibles.
Chlorine	Ammonia, acetylene, butadiene, butane and other petroleum gases, hydrogen, sodium carbide, turpentine, benzene and finely divided metals.
Chlorine dioxide	Ammonia, methane, phosphine and hydrogen sulphide.
Chromic acid and chromium	Acetic acid, naphthalene, glycerol, trioxide turpentine, alcohol and other flammable liquids.
Copper	Acetylene, hydrogen peroxide.

Flammable liquids	Ammonium nitrate, chromic acid, sodium or hydrogen peroxide, nitric acid, halogens
Fluorine	Isolate from everything.
Hydrazine	Hydrogen peroxide, nitric acid, any other oxidant
Hydrocarbons	Fluorine, chlorine, bromine, chromic acid, peroxides, nitric acid.
Hydrocyanic acid	Nitric acid, alkalis
Hydrogen peroxide	Copper, chromium, iron, metals or their salts, any flammable liquid, combustible materials, aniline, nitromethane
Hydrofluoric acid, anhydrous	Ammonia (aqueous or anhydrous).
Hydrogen	Fluoride.
Hydrogen sulphide	Fuming nitric acid, oxidising gases.
Iodine	Ammonia (aqueous or anhydrous), acetylene
Mercury	Acetylene, fulminic acid (produced in nitric acid-ethanol mixtures), ammonia.
Nitric acid (concentrated)	Acetic acid, acetone, alcohol, aniline, chromic acid, hydrocyanic acid, hydrogen sulphide, nitratable substances.
Nitroparaffins (nitroalkanes)	Inorganic bases.
Oxygen	Oils, grease, hydrogen, flammable liquids, solids, or gases.
Oxalic acid	Silver, mercury.
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils and many other organic materials.
Peroxides, organic	Acids (organic or mineral), many organic substances.
Potassium chlorate and potassium perchlorate	Acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulphuric acid.
Silver	Acetylene, oxalic acid, tartaric acid, fulminic acid (produced in nitric acid-ethanol mixtures) and ammonium compounds.
Sodium	Carbon dioxide, carbon tetrachloride and other chlorinated hydrocarbons.
Sodium nitrite	Ammonium nitrate and other ammonium salts

Sodium peroxide	Any oxidisable substance (e.g. ethanol, methanol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulphide, glycerol, ethylene glycol, ethyl acetate, methyl acetate and furfural).
Sulphuric acid	Chlorates, perchlorates and permanganates

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Appendix 2

Incompatible chemicals with toxic hazards

Substances in the left hand column should be stored and handled so that they cannot accidentally contact corresponding substances in the centre column, because toxic materials (right hand column) would be produced.

Substance	Incompatible substances	Toxic hazard
Antimony	Reducing agent	Stibine
Arsenical materials	Any reducing agent	Arsine
Azides	Acids	Hydrazoic acid
Cyanides	Acids	Hydrogen cyanide
Hypochlorites	Acids	Chlorine or hypochlorous acid
Nitric acid	Copper, brass, any heavy metals	Nitrogen dioxide (nitrous fumes)
Nitrites	Acids	Nitrogen dioxide
Nitrates	Sulphuric acid	Nitrogen dioxide
Phosphorus	Caustic alkalis or reducing agents	Phosphine
Selenides	Reducing agents	Hydrogen selenide
Sulphides	Acids	Hydrogen sulphide
Tellurides	Reducing agents	Hydrogen telluride

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Appendix 3. First Aid Contact details

Name	Location	Tel	Defib	Email
David Bremner	Rowett Level 3	8785/8690	Yes	d.bremner@abdn.ac.uk
Gary Cameron	Rowett Level 2	8615/8616	Yes	g.a.cameron@abdn.ac.uk
Claire Fyfe	Rowett Level 3/4	8752	Yes	c.fyfe@abdn.ac.uk
M-J Gordon	Rowett Level 5	8756/8757	Yes	m.j.gordon@abdn.ac.uk
Susan Hay	Rowett Level 5	8756/8757	Yes	s.hay@abdn.ac.uk
Jeannette Ingram	Rowett Level 5	8642	Yes	j.ingram@abdn.ac.uk
Claire Kidd	Rowett Level 3	8690	Yes	c.kidd@abdn.ac.uk
Linda Petrie	Rowett Level 4	8748/8749	Yes	l.petrie@abdn.ac.uk
Sylvia Stephen	Rowett Level 3	8607	Yes	sylvia.stephen@abdn.ac.uk
Elaine Durward	IMS 206/239/323	7314/7329/7341	Yes	e.durward@abdn.ac.uk j.barrow@abdn.ac.uk
John Barrow	IMS 6:32	7493	No	
Linda Duncan	IMS 2:26	7597	No	l.duncan@abdn.ac.uk
Marie Robertson	IMS 4:26	7512	Yes	marie.robertson@abdn.ac.uk
Lesley A Stevenson	IMS 6:41	7409	Yes	l.a.stevenson@abdn.ac.uk

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Appendix 4. Packaging of Infections materials contacts

Claire Kidd	8690	Rowett Level 3
Freda Farquharson	8729	Rowett Level 5

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Appendix 5. Rowett Health and Safety Committee

Role		Tel	Email
Chairman	Peter Morgan	8663	p.morgan@abdn.ac.uk
Minutes	Jeannette Ingram	8642	j.ingram@abdn.ac.uk
	Paul Haggarty	8630	p.haggarty@abdn.ac.uk
	Baukje de Roos	8636	b.deroos@abdn.ac.uk
Lead H& S Coordinator/ Radiation Protection Advisor	Dana Wilson	8752 8753	dana.wilson@abdn.ac.uk
Deputy H&S Coordinator	Susan Hay	8756 8757 8745	s.hay@abdn.ac.uk
TRM	David McKenzie	8610 7467 7468	d.mckenzie@abdn.ac.uk
Biological Safety Adviser	Karen Scott	8730	k.scott@abdn.ac.uk
Genetic Manipulation Adviser	Bill Rees	8637	b.rees@abdn.ac.uk
First Aid Coordinator	David Bremner	8785 8690	d.bremner@abdn.ac.uk

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Appendix 5. Rowett Eye Protection - Approved Exemptions

Task	Hazard	Control Measure
1. Operation of Cryostat	Wearing of eye protection will impede the operator's view this could lead to the operator cutting themselves on very sharp blade. These instruments use blades to cut biological samples, if the operator was cut by this blade it could lead to infection risk.	Eye protection need not be worn when operating the cryostat.
2. Operation of Microscope	Wearing of eye protection will make use of a microscope very difficult. This could increase operator stress and the operator's ability to perform the work to the degree required.	Eye protection need not be worn when operating a microscope.

3. Inputting/Exporting/Analysing data on computers in labs	Eye strain if long periods of screen viewing.	If the computer is situated away from any areas in the lab where hazardous work is being carried out then eye protection need not be worn.
4. Carrying out work in Class 2 biosafety cabinets eg Cell culture labs	Wearing of eye protection will make work in these cabinets difficult and the cabinet already gives operator protection.	Eye protection need not be worn when working with samples within the safety cabinet.
5. Carrying out work in Anaerobic Cabinets	Wearing of eye protection will make work in these cabinets difficult and the cabinet already gives operator protection.	Eye protection need not be worn when working with samples within the anaerobic cabinet.
6. Loading 96 and 384 well plates with small volumes of non-corrosive substances (< 20µL)	Wearing of eye protection will make the precision required for loading of these plates difficult and stressful.	If the setup of these plates is away from areas where any hazardous lab work is being carried out then eye protection need not be worn.

7. Labelling of items prior to experiment starting eg blood tubes collection pots, bags	Wearing of eye protection will make this task unnecessarily stressful due to the care required to ensure all labels are clear and correct.	If the labelling is carried out in an area away from where any hazardous work is being carried out then eye protection need not be worn.
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Risk Assessment of tasks where eye protection will be exempted in Rowett Lab

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