

**Centre for Science at Extreme Conditions
(CSEC)**

Erskine Williamson Building



SAFETY INFORMATION

In an emergency dial 2222 (internal phone)

or 0131 651 3999

(Operator will obtain **Emergency Services** as required)

	Location
Nearest AED (Automated External Defibrillator)	JCMB Level 2 foyer JCMB Level 4 lift lobby
First Aid Room	2301 JCMB
CSEC First Aiders: Steve Hankin Konstantin Kamenev	3.3806 CSEC 3.3802 CSEC
<small>(See First Aid posters for First Aiders and assistance outwith CSEC)</small>	
Emergency eye-wash stations in CSEC	2.2807, 2.2808 2.2809, 2.2810
Emergency shower in CSEC	2.2810

If you have any questions about safety or the information provided in this booklet, please contact the CSEC Superintendent & Safety Adviser:

Dr Steve Hankin
Rm 3.3806
Erskine Williamson Building
Tel: 0131 650 5313
Email: steve.hankin@ed.ac.uk

Feb 2023

Introduction

Being safe and acting responsibly is fundamental to good science and this booklet is intended to give an overview of the hazards and the good practices required to manage risks and maintain our high standards in CSEC and at the University. This constitutes our health & safety management system.

The Director of CSEC is responsible for ensuring that the staff and students work under conditions such that risks are not taken. This means that the Director, staff and students must understand safety procedures and use them in the course of their work. The Director of CSEC is supported in all matters of safety and security by the CSEC Superintendent & Safety Adviser.

CSEC is located in the Erskine Williamson Building which is connected to the James Clerk Maxwell Building (JCMB) on two levels. Care and consideration should be given to the safety of staff, students and visitors in and around CSEC and when accessing JCMB.

Training

You should attend the CSEC Safety Induction annually, to remain informed about local safety practices including fire safety, emergency procedures and workplace hazards.

You should identify and undertake training courses relevant to your work that is required, for example, by legislation, University policy and your risk assessments (e.g. working with display screen equipment, manual handling, CoSHH, laser safety, using cryogenics etc). Information is available on the CSEC intranet along with short training videos on topics including good laboratory practice and lone working.

You should identify and make arrangements for any task-specific *practical* training identified in your risk assessments (e.g. safe use of specific lab equipment, handling cryogenics, waste disposal etc). This should be organised through your supervisor in conjunction with the equipment custodian and Lab Responsible. **No equipment can be used *before* you become an Authorised User.**

Emergencies

In an emergency, **dial 999** to contact the emergency services (Police, Fire, and/or Ambulance Services).

If possible, then contact University Security at Potterow to advise them of the emergency:

1. **telephone 2222 (using an internal phone) or 0131 650 2222 (using a mobile / payphone)**
2. give your name and telephone number
3. state the nature of the emergency and whether or not there are casualties
4. give the precise location of the emergency (Erskine Williamson Building, Room number)
5. wait for confirmation that your message has been understood

Stand-by to render assistance unless by doing so you expose yourself to personal risk. University Security will direct trained personnel to the site of the incident and direct the emergency services to the location of the incident if possible. If help does not reach you in about ten minutes repeat the call.

Reporting of Incidents

Details of any accident, incident or near-miss must be reported and recorded using the University's online Accident & Incident Reporting System (<https://www.accidents.is.ed.ac.uk/>). Even if there is no personal injury a hazardous situation or a **significant near miss** should be reported and drawn to the attention of the CSEC Superintendent & Safety Adviser, so that action can be taken to prevent reoccurrence. Reports can be made independently or with the assistance of the CSEC Superintendent & Safety Adviser. Details of all fires, however small, must also be reported directly to the University Health and Safety Department.

Fire & Emergency Evacuation

Erskine Williamson Building (as part of the JCMB building complex) is a Zoned Alarm Building where there may either be a SINGLE ZONE or ALL ZONE evacuation. Emergency evacuation for each zone is signaled by a pre-recorded message from the alarm address system and flashing beacon on the zone boundary.

Specific information on the procedures to follow in the event of a fire or needing to evacuate the building are provided in the joint JCMB/CSEC Emergency Evacuation Procedures guidance.

Risk assessment

Carrying out a risk assessment is an important step in considering and describing how to carry out experimental work safely and effectively. A risk assessment must be carried out for all experimental work and approved **before** the work is started. You can use a Risk Assessment form provided by your School or the *CSEC Risk & CoSHH Assessment* form available on the CSEC intranet. For advice, contact the CSEC Superintendent & Safety Adviser. The approval for students and research staff is to be given by your supervisor, for all other staff this should be your line manager, and for visitors it is the 'Lab Responsible' designated for the lab.

Lab	Lab Responsible
1.1800 X-ray Lab	Stewart McWilliams
1.1801 AFM Lab	Vasileios Koutsos
1.1803 Gas Loading Lab	Eugene Gregoryanz
2.2801 Green Raman Lab	Eugene Gregoryanz
2.2802 Red Raman Lab	Eugene Gregoryanz
2.2803 DAC Loading Lab	Malcolm McMahon
2.2807 Instrumentation Lab & Workshop	Konstantin Kamenev
2.2808 Quantum Ordering Lab	Andrew Huxley
2.2809 X-Ray Lab	Stewart McWilliams
2.2809A Spectroscopy Lab	Ingo Loa
2.2809B Laser Drilling Lab	Eugene Gregoryanz
2.2810 Chemistry Lab	Andrew Huxley
3.3809 Magnetism Lab	Konstantin Kamenev

In addition, work involving the following *special* hazards requires specific approval by the designated Lab Responsible or the relevant Safety Supervisor:

- ! Lasers (Classes 3B & 4) – Eugene Gregoryanz (CSEC Laser Safety Supervisor)
- ! Gas Loading – Eugene Gregoryanz
- ! Large-volume piston-cylinder cells – Konstantin Kamenev
- ! X-Rays – Steve Hankin (CSEC Radiation Protection Supervisor)

Lab Responsibles have the delegated authority and responsibility for ensuring that work is being carried out safely and that lab users adhere to the requirements of CSEC's health & safety system. This includes review of your risk assessments.

A copy of the completed Risk Assessment(s) should be kept in the relevant laboratory (in the Red Folder) and signed by everyone carrying out the experimental work to confirm that the assessment and all safety requirements have been understood. A copy should also be uploaded to the *online* Red Folder for the relevant lab, on the CSEC intranet.

Hazards

Electrical

Electrical hazards are the most wide-spread risk in CSEC. These arise from mains power supply, DC power and high voltage supplies and other pieces of equipment including computer monitors as well as capacitive power in many systems, for example laser or photo-multiplier power supplies. The severity of electrical shock is determined by current, with currents of greater than 50 mA being frequently fatal. The resistance of the human body is highly dependent on skin moisture and earth contact, and in the worst conditions a fatal electric current can result from as little as 40 V.

Mains powered equipment and all electrical supplies must be kept clear of water and moisture. Hands must be dried before contact with any mains powered equipment or mains cables. Any equipment with frayed or damaged electrical wiring must be isolated immediately, reported to the CSEC Superintendent, rectified and tested before being re-used.

Portable Appliance Testing (P.A.T.)

Some mains powered electrical equipment in CSEC is subject to PAT electrical safety testing. All eligible equipment must have a test label giving the date tested and signature of the tester. Periodic testing is usually arranged by the CSEC Superintendent, in line with the University testing policy.

If electrical equipment is found without an up to-date electrical test label please ask the CSEC Superintendent if it requires testing.

No electrical equipment must allow access to live mains power, and the repair of such equipment that requires access to live mains must be undertaken under supervised conditions, for example in the Electronics Workshop in JCMB.

High voltage, such as in photo-multiplier, x-ray tubes and laser supplies can result in fatal electrical shocks under all conditions. All high voltage devices and cables must be clearly labelled and rules for handling high voltage strictly adhered to. In addition many DC high voltage systems contain large capacitive storage and represent a severe electrical risk even when isolated from the mains supply.

Physical / Mechanical

Physical or mechanical risks exist throughout CSEC, mainly in areas where heavy equipment is being used or moved. Care must be taken with the operation or movement of heavy equipment and the correct lifting equipment must be used. Risks should be identified in the Risk Assessment and the correct operating and safety procedures applying to each machine or procedure must be understood prior to use. A written Safe System of Work (or Standard Operating Procedure) should accompany the Risk Assessment. Mechanical risks also exist from cables, badly placed furniture and faulty or broken equipment. All such instances must

be brought to the attention of the lab responsible or the CSEC Superintendent & Safety Adviser.

Chemicals

All chemicals must be treated as potentially harmful. The law requires that the use of chemicals that may pose health risks need to be assessed and documented safety procedures (a Risk Assessment, CoSHH Assessment and Safe System of Work) must be provided. These must be consulted and understood before use of the chemical and all safety procedures adhered to. Any required safety equipment must be provided and used. Safety glasses and a lab coat must be worn at all times in the Chemistry Laboratory (2.2810) and when moving or handling chemicals in any other laboratory.

When new chemicals are introduced to CSEC, a CoSHH assessment **MUST** be undertaken, documented, and necessary safety procedures agreed with the Chemical Safety Supervisor (Andrew Huxley, Rm 2619 JCMB) before the chemicals are used.

Sharps

All sharps such as syringe needles, blades and glass **MUST** be disposed of properly into a proper Sharps Bin (usually yellow). Syringes and blades should not be re-sheathed before placing in the Sharps Bin and the container should not be over-filled (the lid must be able to close properly prior to disposal). When full, the Sharps Bin should be sealed and disposed of via Physics Stores and a replacement container obtained.

If a needle stick injury occurs, immediately contact a First Aider and notify your supervisor and the CSEC Superintendent & Safety Adviser.

Pressurised Gases

Pressurised gas cylinders present a significant hazard in terms of their weight and high pressure contents. All gas cylinders must be secured during storage, use and transport and must never be accompanied in lifts. Cylinders should not be left unaccompanied on trolleys for long periods of time. Cylinders must be secured upright, using a bench clamp or cylinder stand. In addition, some gases present a chemical hazard, and must be handled in accordance with the CoSHH Regulations.

Only regulators appropriate to the pressure and contents of the cylinder must be used. Extreme care must also be exercised when changing gas regulators. This must only be carried out by someone who has been trained in handling cylinders. Gas regulators must be replaced every five years with some, in the case of corrosive gasses, required to be changed more frequently. New regulators are date stamped; if you find an out of date regulator, or one without a date stamp, it should not be used.

Cryogenic Fluids

Liquefied gases must be stored and dispensed from dewars in areas with oxygen depletion sensors. Users must read, understand and sign the risk assessment forms before dispensing and working with any cryogenic fluids.

A significant risk of harm to skin and eyes from splash or contact with cryogenic fluids requires suitable protective clothing and eye protection to be worn at all times while preparing dewars and transferring cryogenic fluids. An asphyxiation risk exists with the liquefied gases used in CSEC (mostly liquid N₂). Storing and dispensing from dewars must only be done in areas that have oxygen depletion or oxygen sensing alarms. Decanting must be carried out in a controlled manner and with lab doors open during transfer. Transferring cryogenic fluids from dewars to instruments must never be left unsupervised; there must always be at least one other person present throughout the transfer. Decanting cryogenic fluids should never be carried out by a lone worker. Cryogenic fluids should be transported in proper containers only

and dewars must never be accompanied in lifts. If a dewar requires the use of the lift, users should take the stairs and meet the lift when it arrives at the required floor. Portable Oxygen monitors are available from the CSEC Superintendent & Safety Adviser.

To avoid damage to the floor material some form of thermal insulation must be used under the vessel you are filling. Mats have been provided in the Chemistry and Magnetism Labs for this. Do not spill the liquid gas onto the unprotected floor.

Radioactive Sources and X-Rays

Radiation protection and risk evaluation is monitored by the CSEC Radiation Protection Supervisor (Steve Hankin, Rm 3.3806) and individual rules are set to ensure safe working in each case.

All radiation/x-ray work must be agreed with the Radiation Protection Supervisor before being undertaken and all local rules strictly adhered to.

High voltage supplied to x-rays systems and nuclear detectors are a severe electrical risk and local rules of handling of high voltage must be adhered to.

Anyone working with x-ray or radioactive sources must attend the University of Edinburgh Radiation Protection course.

Lasers

All lasers represent a risk to eyes, and high powered lasers a risk on skin contact. In extreme cases they are a fire hazard. Laser safety is monitored by the Laser Safety Supervisor and individual rules are set to ensure safe working in each case. These rules must be strictly adhered to. A written Safe System of Work must be completed and approved by the CSEC Laser Safety Supervisor (Eugene Gregoryanz, Rm 3.3804) before any work is carried out.

Anyone working with lasers must complete the University of Edinburgh Laser Safety course. Practical Laser Safety training is available in CSEC.

High voltage supplies to all lasers are a severe electrical risk. They usually also contain large capacitive storage, so are a severe risk even when isolated from the electrical supply.

High Pressure

Mechanical pressures are used in a variety of work, when working with Diamond Anvil Cells and preparing samples.

For work involving large-volume piston-cylinder cells, your Risk Assessment and Safe System of Work must be approved (by Konstantin Kamenev, Rm 3.3802) before starting. All necessary safety equipment must be used and you must be trained in using the equipment.

Gas loading experiments involve high pressures and gases where there may be a risk of explosion. This work must only be carried out by competent, trained personnel, in laboratories designated for this type of work. A Risk Assessment, Safe System of Work and training must be completed and approved (by Eugene Gregoryanz, Rm 3.3811) before any work is carried out. All necessary safety equipment must be used.

High Temperature & Ovens

When working with any equipment creating high temperatures it is essential that people and combustible materials are protected from any possible contact. Vessels must be suitable for use at the high temperatures and the risk assessment should consider and mitigate any hazards from volatiles released during heating. When using ovens protective gloves or tongs should

be used to lift hot items. Anything hot should be placed onto heat resistant material and not directly onto the floor or bench.

When working with Radio Frequency generators no metal items, such as jewellery, should be worn in the laboratory.

Biological

All work involving biological hazards must be agreed with the CSEC Superintendent & Safety Adviser in conjunction with the relevant School's Biological Safety Officer, before being undertaken in CSEC and all local rules adhered to.

Safe System of Work

A written Safe System of Work must be provided for activities involving hazards and equipment, and should include instructions on:

1. start-up
2. normal safe working procedures
3. normal shut down
4. emergency shut down

These must be kept with the Risk Assessment in the laboratory's Red Folder. The contents of Red Folders are audited periodically for completeness and effectiveness.

Laboratory Supervision

Everyone working in and associated with CSEC must complete and return a CSEC Personnel Information form and Safety Declaration available on the CSEC website or from the CSEC Superintendent & Safety Adviser.

Many research laboratories contain significant potential hazards including high voltage, chemical agents, ionising and non-ionising radiation. Everyone conducting experimental work in a laboratory must be competent in carrying out the work or be supervised by a competent person whilst being trained. All local rules must be obeyed regarding these hazards.

Training Records

PIs and Lab Responsibles must ensure that all personnel using equipment in CSEC have been properly trained and are competent to use the equipment. A list of all authorised users who have been approved by the academic supervisor / instrument custodian / Lab Responsible should be kept up to date in the Red Folder and a record of who carried out the training should be available.

All users of x-rays and lasers must attend the University of Edinburgh Radiation Protection and Laser Safety courses.

Undergraduates

If undergraduates are to be given access to Laboratories for project work they must complete the relevant University training course(s). A Training Record form must be completed by the supervisor for all activities.

All relevant risk assessments and CoSHH forms must be read and signed by the student. Any work/procedures carried out by undergraduates must be approved by the academic supervisor prior to the work commencing.

In the case of x-rays and lasers there must be no risk of exposure to direct unenclosed beams at any part of the experiment. Undergraduates must not be left unsupervised in laboratories or carry out any hazardous work or beam alignments.

Working outside normal hours (before 0800 and after 1800 Monday to Friday, and weekends) is particularly hazardous, and activities involving severe hazards, such as high voltage, must not be undertaken. **Lone working out of hours in laboratories is not permitted**. Remember there is no emergency safety team outside normal hours. All out of hours working must be risk assessed and approved by the academic supervisor and a copy held by the CSEC Superintendent & Safety Adviser.

All personnel in the building outside normal working hours must sign the access book at the main door and ensure they comply with University and CSEC rules on after hours and lone working.

Working in locked laboratories is not allowed unless they are fitted with emergency entry switches. In laboratories fitted with combination locks these must be in the unlocked position when the laboratory is occupied and locked by the last person leaving.

Visitors (Rules for academics, students, schools and children)

Academics and visiting researchers are bound by the same safety rules as local staff. The staff inviting visitors must inform the CSEC Superintendent & Safety Adviser when the visitor arrives and to what equipment and facilities they require access. They must be issued with the safety leaflet and informed of any safety rules associated with their work. Visitors working in CSEC must complete any required University of Edinburgh safety courses.

School Parties: parties of school students visiting the University must be supervised at all times and not left free to wander round the building. The CSEC Superintendent & Safety Adviser must be informed prior to the party arriving.

School Students: individual school students making use of laboratories must be supervised at all times in the laboratory. They must also complete the relevant safety form.

Children: children are not normally allowed in University buildings. If for any reason a child has to be brought into the building they must be kept under supervision at all times and are not permitted to enter laboratories.

Safeguarding our Working Environment

CSEC is a **NO SMOKING** environment. Smoking is not permitted in any part of the building.

Laboratories must be kept tidy, free of loose cables, waste paper and carelessly located equipment that can block fire escapes or emergency access to the room. Samples must be labelled and stored appropriately. Samples no longer needed should be disposed of appropriately and not left abandoned in laboratory drawers / cupboards.

Offices and general workspaces must be kept tidy and free from loose cables, large amounts of waste paper, heavily overloaded shelves and other physical risks. Personally owned heaters and kettles are not permitted in offices.

Computer users should ensure they have a comfortable seating location to reduce the risk of posture and repetitive strain injury. The computer screen must be flicker-free and comfortably readable. Chairs should be adjustable for height and backrest position and should have a stable (5 spoke) base.

Regular computer users must carry out an assessment for their own visual display unit/work station. An online course on VDU use is available and should be completed by all staff who use VDUs on a regular basis:

(<https://secure.cardinus.com/launch.asp?id=unive30748&admin=true>)

Assessment forms and further information including DSE/VDU eye tests are available online (<http://www.ed.ac.uk/schools-departments/health-safety/guidance/workplaces-general/personal-computing>). If the assessment recognises that remedial action is required then please contact the CSEC Superintendent & Safety Adviser.

All **public access areas** within CSEC must be kept clear of rubbish, trip and slip hazards such as cables liquids or hazardous substances that are dropped. This applies to all corridors, stairwells, toilets, kitchen, seminar room, reading room and meeting rooms. Anything that is dropped on the floor must be cleaned up as soon as possible.

Fire exits must be kept clear of obstructions at all times.

Before leaving a laboratory, disposable safety gloves should be removed and discarded, unless you are carrying hazardous substances, in which case a one glove policy is in place - gloved hand to carry the item (ideally secure in a closed container) and un-gloved to open doors etc.

No PPE should be worn in any food or public meeting areas.

No running, cycling or any other means of movement by mechanical device is permitted in the corridors and stairwells. Be aware of your surroundings to avoid accidents. Extra care should be taken when carrying a load. Use the lift whenever at least one hand isn't free to use the stair handrail.

On completion of your studies or time working in CSEC, you should remove all items belonging to you and leave your desk and laboratory workspaces in a clean and tidy condition. Inform your supervisor of any items (e.g. samples, papers, data, lab books etc) being left behind for reference or future use.