Logo, company name

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Laboratory Safety Manual

Laboratory Name:

Chief Investigator / Laboratory Manager / Technical Coordinator / Technical Officer:

Department:

Version:

[Date]

Template Version: 1.1

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# Introduction

[All writing in red requires customisation for your laboratory, after which this paragraph should be removed, and all red fields returned to black text.]

The University of Newcastle is committed to its staff, students and visitors (including contractors) to achieve the maximum safety that is reasonably practicable. Laboratories contain numerous potential hazards, but with suitable controls the risks from these can be minimised or eliminated. This manual is provided to document the safe practices required to maximise safety and be the basis for training of all laboratory personnel accessing the facility.

This manual refers to additional sources of information in the laboratory (which may be physical or electronic) and may include, but not be limited to:

* An SDS folder - which provides safety information about chemicals in use.
* An Equipment folder - which contains register of all equipment, operating manuals, risk assessments, procedures, test and maintenance records.
* An Induction folder - which records the individuals approved for access into the laboratory, who have completed the site-specific induction and training relevant to this laboratory.
* A Procedures folder - contains the Risk Assessments for procedures undertaken, SWMS and SOPs for the laboratory and should be used part of the induction and reviewed as per laboratory policy.
* A Safety Review folder containing all safety applications submitted for approval, and the associated approval conditions.

These folders are located: [folder location]

# Description

## Laboratory LayoutWear-protective-glovesA red and white sign Description automatically generated with low confidence

Laboratory Balance Area

 AED

Emergency Exit

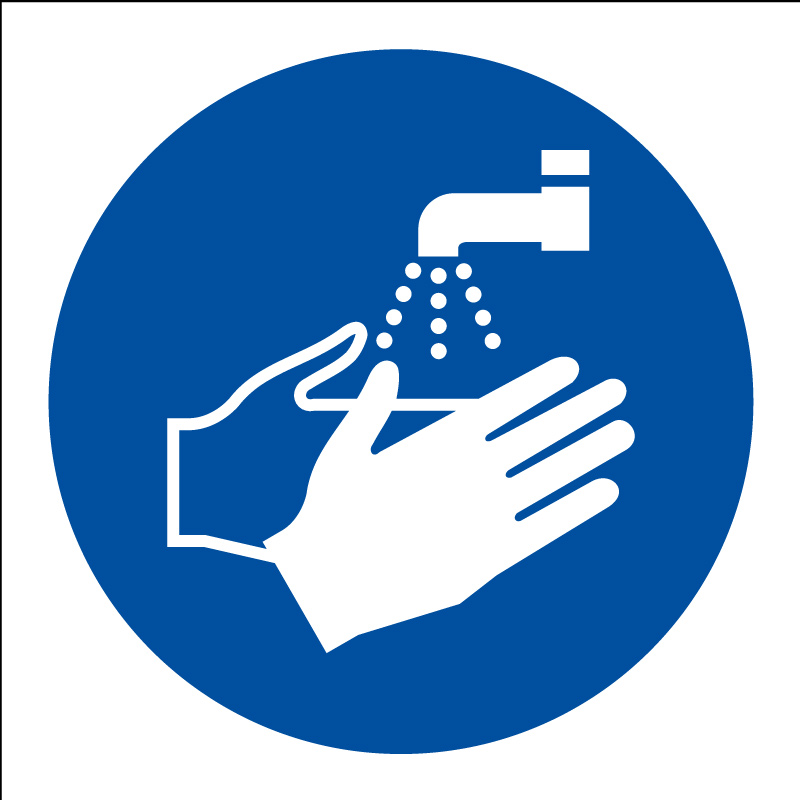
 Emergency Stop

 Eye Wash Station

 Fire Extinguisher

 First Aid Kit

 Glove Dispenser

 Hand Wash Station

 PPE Located Here

Laboratory Bench

BSC

BSC

BSC

BSC

Balance Bench

INC

INC

INC

-80

-20

Laboratory Bench

Laboratory Bench

Laboratory Bench

Figure 1 Example Laboratory Layout

[The image above is an example of a Laboratory configuration. By using the legend to populate the floorplan of your laboratory, you can illustrate the location of emergency equipment and any emergency egress to the users of this manual.]

## Laboratory Emergency Procedure

The [University Emergency Procedure Guide](https://search.newcastle.edu.au/s/redirect?collection=default_collection&url=https%3A%2F%2Fwww.newcastle.edu.au%2F__data%2Fassets%2Fpdf_file%2F0005%2F511682%2FProcedure-Guide.pdf&auth=3RBQowwKtJ3akWt7A%2FN5TQ&profile=_default&rank=1&query=emergency+procedures) provides emergency responses applicable to each campus for Fire, Medical Emergency, Bomb Threat, Internal Emergencies, External Emergencies and Personal Threats.

## Assembly Point

The evacuation assembly point for this building is [evacuation location].

## Emergency Evacuation

In the event of an emergency evacuation of this laboratory, the following actions should be undertaken when safe to do so:

* [If the following equipment is in use, then institute an emergency shutdown prior to leaving the laboratory:
* [Gases should be closed off at the bottle or by activation of manual gas stops (if available)]
* [The lids should be replaced on any open chemical container]
* [Lids should be replaced on any cell culture work]

## Safety and Emergency Equipment

|  |  |  |  |
| --- | --- | --- | --- |
| **Equipment Description** | **Location** | **Maintained by** | **Contact Info** |
| Defibrillator – nearest unit |  | IFS | 49216500 |
| Eyewash Station |  | IFS | 49216500 |
| Fire Blanket |  | [Laboratory Manager] |  |
| Fire Extinguishers |  | IFS | 49216500 |
| First Aid Kits |  | First Aid Officer |  |
| PPE |  | [Laboratory Manager] |  |
| Spill Kit |  | [Laboratory Manager] |  |
| [Gas Sensor and alarm] |  | [IFS] | [49216500] |
|  |  |  |  |
|  |  |  |  |

## Emergency Contacts

|  |  |  |
| --- | --- | --- |
| **Emergency Contacts** | **Phone number** |  |
| Security Services | 49215888 |  |
| Fire, Ambulance or Police | 0 000  112 (From a mobile) | Specify service when prompted |
| NSW Poisons Information Hotline | 131126 |  |
| First Aid Officer | x | [Name of First Aid Officer] |
| Evacuation Warden(s) | x | [Name of Evacuation Warden(s)] |
| WHS Officer | x | [Name of WHS Officer] |
| IFS | 49216500 |  |
| University Health, Safety & Wellbeing | 49339999 Option 5 |  |
| University Health Service | 49216000 |  |
|  |  |  |
|  |  |  |

Further information about the operation of the laboratory can be obtained from the following people:

|  |  |  |
| --- | --- | --- |
| **Name** | **Role** | **Contact** |
| [Insert Name] | Laboratory Manager / Technical Coordinator / Technical Officer |  |
| [Insert Name] | Senior Work Health and Safety Specialist | 4033 9999 (Option 5) |

## Emergency Response / First Aid Response

The first action in an emergency is to assess the situation to understand whether it is minor – e.g. a small spill and can be dealt with locally or has the potential to injure or affect other people – e.g. uncontrolled release of gases, and a wider emergency response is required.

If a person is injured follow the DRSABCD first aid response protocol:

* Danger
  + is there an ongoing danger in the area?
  + Is it safe to approach an injured person?
* Response – Is the person conscious / responding?
* Send for help – ensure that external help is on the way – i.e. first aider / Security / 000 as required.
* Airways – ensure airways are clear
* Breathing – does the person have regular breathing?
* CPR – begin chest compressions and breaths, continue until help arrives or the patient recovers
* Timeline

  Description automatically generatedDefibrillation

Figure 2 St John Action Plan

# Roles and Responsibilities

## Head of School/General Manager

Accountable for the safe operation of all facilities and the safety of all personnel under their authority. Responsible to ensure safety processes and procedures are in place and are being implemented, and that safety documentation has been developed and is current.

Responsibilities include:

1. provide and make financial allocation for appropriate safety resources and risk control measures for staff and where required, other workers, students and visitors
2. ensure appropriate risk management procedures are implemented
3. ensure adequate training and supervision is available
4. ensure procedures are adopted for the maintenance of laboratory equipment
5. communicate the requirements for staff and other workers, students and visitors to prepare and follow Safe Work Method Statements (SWMS) and Standard Operating Procedures (SOP) when required
6. appropriate resources are provided to achieve the requirements of this manual.
7. legislative compliance is achieved.
8. effective oversight in Laboratories is provided through the appointment of a Laboratory Manager / Technical Coordinator / Technical Officer.

## Chief Investigator / Laboratory Manager / Technical Coordinator / Technical Officer/ Technical Coordinator / Technical Officer

Responsible for the day-to-day management of workplace health and safety for all users of the laboratory and for monitoring the implementation of this manual.

The Chief Investigator / Laboratory Manager / Technical Coordinator / Technical Officer / Technical Coordinator / Technical Officer engages with all workers to ensure they remain safe and adhere to the required risk control measures. The Chief Investigator / Laboratory Manager / Technical Coordinator / Technical Officer / Technical Coordinator / Technical Officer will ensure that the provision of:

1. adequate training and supervision for all users of the laboratory
2. maintenance of laboratory equipment and facilities as per manufacturer requirements
3. communication of WHS requirements to all users of the laboratory
4. risk management procedures are implemented so that hazards are identified, risks assessed and risk controls selected and implemented to prevent injuries and incidents occurring in their area of responsibility
5. Safe Work Method Statements (SWMS) and/or Standard Operating Procedures (SOPs) for all potentially hazardous laboratory activities and will ensure they are followed
6. clear and appropriate signage
7. development and implementation of site-specific laboratory inductions for all workers
8. oversight of facility access by ensuring all laboratory users meet the requirements to be allowed access to the facility and that access control is enforced
9. effective management of any identified hazards
10. regular safety walk-throughs and inspections of the laboratory
11. participation in safety inspections of the laboratory by other groups
12. implementation of corrective actions recommended by inspections

## Staff / Workers

All workers must:

1. co-operate and actively contribute to workplace health and safety management by complying with relevant policies, procedures and guidelines
2. Follow the requirements outlined in SWMS and SOPs
3. report circumstances where additional hazards are identified or changes to the activity warrant a review of the SWMS or SOP
4. participate in risk management activities to identify, assess, control and review WHS risks in the workplace
5. report injuries, incidents and near-misses to their immediate Technical Coordinator / Technical Officer and the Laboratory Manager / Technical Coordinator / Technical Officer / Technical Coordinator / Technical Officer
6. follow any reasonable direction issued by the appropriate persons
7. undertake any inductions, competencies or training reasonably requested by the Laboratory Manager / Technical Coordinator / Technical Officer / Technical Coordinator / Technical Officer
8. report any damage or misuse of laboratory equipment or safety equipment
9. take reasonable care of themselves and others in the workplace and ensure that their actions or omissions do not adversely affect the health or safety of other persons

## Students

Students who access the laboratory must:

1. wear the correct personal protective equipment as identified on the main laboratory door
2. never operate any equipment they have not been deemed competent to use
3. never communicate with someone who is using equipment. A sudden change in concentration, can result in an incident
4. understand that fooling around and practical jokes in the laboratory will not be tolerated
5. only access the laboratory with an authorised person (if they are not authorised)
6. always comply with the directions of the authorised person while in the laboratory
7. report injuries, incidents and near-misses to the Laboratory Manager / Course Coordinator / Technical Coordinator / Technical Office / Technical Coordinator / Technical Officer

# Laboratory Access

**ACCESS TO THE LABORATORY IS RESTRICTED.**

Access is provided only for persons who have been inducted or are under the direct responsibility of an inducted person.

All persons accessing the laboratory must comply with the minimum PPE requirement as identified on the main laboratory door.

**CORE HOURS** of the laboratory are [time]am to [time]pm. The laboratory can only be accessed during these times unless otherwise authorised.

Unsupervised laboratory access will only be provided to workers who have:

1. completed the University Health and Safety Induction (online on Discover)
2. completed the University Laboratory Safety Introduction course (online on Discover)
3. completed the site-specific Laboratory Induction (checklist provided as Appendix A)
4. familiarised themselves with this laboratory manual
5. the required personal protective equipment
6. been authorised as a laboratory user by Name of the approver

The laboratory must be kept secured when not in use. Only authorised persons will be provided with key/swipe access for the laboratory.

The list of authorised persons will be maintained by the Laboratory Manager / Technical Coordinator / Technical Officer and is kept in the Induction folder.

***Working safely is a condition of access to the Laboratory facility.***

***Failure to observe safe working practices and procedures can result in the withdrawal of access privileges.***

## Applying for Access

### Staff

All staff are required to submit a Maximo request for either a physical key or electronic access. When submitting the Maximo request, select positional title as the approver.

### Students/Visitors/Affiliates

Students, visitors and affiliates who do not have access to Maximo are to complete the [Key and Electronic Access Request Application](https://www.newcastle.edu.au/__data/assets/pdf_file/0018/80307/Key-and-Electronic-Access-Request-Application-Form.pdf)

The applicant should sign the “Signature” section at the bottom of the form and have the “Restricted Area Approval” section of the form signed by their Lab Manager / Technical Coordinator / Technical Officer before sending the completed form via email to name of the approver@newcastle.edu.au.

These records will be kept in the induction folder.

# 

# Laboratory Ettiquette

1. Only authorised workers can access the laboratory
2. No eating, drinking, smoking, handling contact lenses or applying cosmetics in the laboratory
3. Storage of food or drink in the laboratory is prohibited
4. Taking eating / drinking utensils into the laboratory is prohibited
5. Wear the correct PPE for the activity you are performing
6. Correct footwear must be worn as per minimum safety requirements, no open-toed, open-heeled or bare feet are allowed in the laboratory
7. Long hair or loose-fitting clothing must be restrained before starting any laboratory activity
8. Ear buds/Headphones must not be used while in the laboratory. The use of this equipment prevents awareness of your surroundings and creates an environment of potential hazard.
9. Mouth-pipetting is prohibited
10. The laboratory doors must be kept closed when work is in progress and secured upon leaving
11. Immediately notify the Laboratory Manager / Technical Coordinator / Technical Officer of any faulty or broken equipment
12. Ensure floors are unobstructed and any materials / storage under benches can be readily removed for cleaning
13. Keep your work area tidy. Clean benches after procedures are completed
14. PPE MUST be removed before leaving the laboratory, touching door handles, or the telephone
15. Clean up any spills immediately
16. Wash hands prior to leaving the laboratory and after contact with materials which may be contaminated
17. Workers obviously affected by drugs or alcohol **will not be permitted** in the laboratory
18. Workers with any health problems that may affect workplace safety (e.g. medication, epilepsy) should consult with the Laboratory Manager / Technical Coordinator / Technical Officer so that appropriate risk controls can be developed and put in place.

# Induction, Training and Competencies

## Induction

The induction requirements for working in the laboratory will be detailed by your Laboratory Manager / Technical Coordinator / Technical Officer.

All Laboratory users are required to complete the University Health and Safety Induction and the University Laboratory Safety Introduction course.

In addition, the Laboratory Manager / Technical Coordinator / Technical Officer will conduct a site-specific induction into the laboratory space and detail any additional training courses which will be required prior to you conducting activities in the lab.

Records of completion of induction and training should be placed in the Laboratory Induction Folder.

The site-specific induction checklist is available in Appendix A.

## Competencies

All workers will be required to develop and demonstrate competence prior to being permitted unsupervised use of any equipment or to undertake any activities in the laboratory.

Individual training programs and assessment will depend on the nature of the work undertaken, the current level of experience of the person and their need to work unsupervised. The regularity of ongoing training and competence assessment will be determined by the Laboratory Manager / Technical Coordinator / Technical Officer.

A training record for all persons who are permitted to conduct activities in this laboratory will be recorded and retained in the Induction folder. A sample training record is available as Appendix B.

# Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) is to be used in line with risk assessments and SOPs. PPE must be fit for purpose, well-maintained and should be replaced as required. PPE will be provided to lab personnel as required. Undergraduate students will be provided with short-term use PPE at the discretion of the Laboratory Manager / Technical Coordinator / Technical Officer.

Minimum PPE requirements are displayed on signage on the main door to the Laboratory. Where additional PPE is required in select areas of the laboratory, signage is displayed in these locations to ensure all workers are aware of these requirements.

PPE required to perform your job is supplied by the laboratory and each user must ensure it is in good condition prior to its use. Any damaged or faulty PPE must be reported to the Laboratory Manager / Technical Coordinator / Technical Officer immediately so that it can be replaced. Damaged/faulty PPE must NOT be used.

If for any reason required PPE is unavailable, then the task must NOT be undertaken, and the Laboratory Manager / Technical Coordinator / Technical Officer notified.

In this laboratory the minimum requirements for PPE are:

* Safety glasses
* Protective footwear, covering the toes, the upper surface of the foot and the heel must by worn at all times. [Include here if steel caps are required]
* Laboratory gown [or lab coat]
* Long hair must be tied back.
* [any further minimum requirements.]

The table below details the various types of PPE you will likely encounter, this is a guide only and if in doubt about which PPE is the correct type, seek the advice of the Laboratory Manager / Technical Coordinator / Technical Officer or refer to the SDS.

## Gloves

Laboratory gloves shall be worn either when:

* + working in any laboratory area that poses a potential hazard to the hands or
  + handling material/equipment that poses a chemical, biological or radiological risk.

Gloves are provided to cover these two main categories:

1. A protective glove is designed to keep you safe from hazards including burns or abrasion. Wearing the right protective gloves can be instrumental in preventing extreme heat or extreme cold from causing injury to the hands. Refer to your Risk Assessment or SOP for the correct gloves for the task to be undertaken.
2. Laboratory chemical resistant gloves shall be worn whenever there is risk of contact with chemical, biological or radiological materials. Laboratory gloves not only protect hurt your skin from protentional harmful contact with the material you may be working with but also protect from skin staining which may further cause irritations. The Risk Assessment for the activity to be undertaken will inform which type of glove should be worn to protect the wearer. The table below illustrates some of the different glove types and their typical usage.

Gloves shall be removed when:

* Answering the phone
* Using a door
* Typing on a keyboard

Refer to Appendix E for the technique for the safe removal of contaminated gloves.

## Activity Specific PPE and Clothing

Some laboratory activities require specialised PPE e.g. full-face shield for work with cryogenic liquids. [This section is for setting out what specialised PPE is used in the laboratory, what activities it is used for and how it must be maintained to remain in a serviceable condition.]

### Examples of PPE

|  |  |
| --- | --- |
| LAB GOWNS  The gown protects the wearer from both the activities they are undertaking, and the activities undertaken by others in the lab. Shall be worn in laboratory at all times and removed before exiting the area (hung on coat hooks) with exception that they can be worn were a corridor connects two laboratory facilities. Gowns and gloves must not be worn in the goods lift or in offices, toilets or where food is consumed.  Gowns are laundered regularly to ensure they are clean and safe. | A picture containing text, clipart  Description automatically generated |
| SAFETY GLASSES  It is an expectation that safety glasses are to be worn in the laboratory at all times. Prescription safety glasses may be required (the worker will need to discuss this with the Laboratory Manager / Technical Coordinator / Technical Officer if they normally wear prescription glasses), but over-glasses may be provided if it is a safe alternative.  Any laboratory that does not abide by this expectation must carry out and document a pertinent risk assessment. | A close-up of a magnifying glass  Description automatically generated |
| SAFETY GOGGLES  Are available in the building chemical spill kits. | A close-up of a shoe  Description automatically generated with medium confidence |
| HALF-FACE RESPIRATOR  Are available in the building chemical spill kits, for use with cleaning up significant spills. Ensure that the filter cartridges have been fitted to the mask, are in date, and that it is properly adjusted to the wearer before using. The filters provided are combination filters with the color code band showing the filter types. Training in proper use is provided in the face-to-face chemicals training course. | A pair of headphones  Description automatically generated with low confidence |
| FULL FACE SHIELDS  Must be worn by all persons in the vicinity when handling liquid nitrogen. |  |
| SURGICAL MASKS  Provide barrier protection against droplets including large respiratory particles and are often used to provide protection from materials, such as micro-organisms when there is the risk of producing droplets or splashes. Surgical masks are not designed for use as particulate respirators and do not provide as much respiratory protection as an N95 respirator. | A picture containing handcart  Description automatically generated |
| P2/N95 MASKS  Should be worn if there is any risk of fine aerosol after a biological spill or if handling materials with fine particles. These masks must be fit-tested to select the appropriate size and style then fit-checked each time such a mask is worn. Facial hair will prevent a proper seal.  <https://www.safeworkaustralia.gov.au/covid-19-information-workplaces/industry-information/home-services/masks> | https://smartairfilters.com/wordpress/wp-content/uploads/2020/04/UV-Light-Disinfect-Mask-Mask-Sample-1-768x793.jpg |
| FULLY ENCLOSED LEATHER (or equivalent water-resistant, sharps-resistant material) SHOES  It is a university requirement that enclosed footwear must be worn in the laboratory. Shoes that completely protect the top of the foot, and cover the heel, with a non-slip sole, must be worn at all times in laboratory areas.  **Laboratory will indicate if safety shoes/boots are required**. | A picture containing footwear, clothing  Description automatically generated |
| CRYOGENIC APRON  To be used as additional protection when handling cryogenic liquids | A picture containing icon  Description automatically generated |

|  |  |
| --- | --- |
| GLOVES – refer to Safety Data Sheets (SDSs) to determine which gloves are appropriate for use with different chemicals.  *Latex:* Due to allergy concerns latex should only be used if other gloves are unsuitable for the activity. Various types of latex gloves (sterile and non-sterile) are available and should be used when there is a possible risk of damage or contamination to the skin. Excessive use of latex gloves, however, can lead to latex sensitisation. It is recommended that hands are washed before and after using latex gloves, and that a moisturiser is used frequently. Powder free gloves are also available for those with allergies.  NB: Latex gloves are not impervious to all chemicals. Refer to the SDS for information on suitable gloves  *Nitrile*: gloves are more chemically resistant than latex gloves, and must be worn when handling some chemicals, including acrylamide. They are suitable for people with latex allergies and are effective protection against all infectious agents.  *Vinyl* gloves (PVC) are more resistant to radioactive substances, and must be worn when handling radioisotopes  *Cryogloves* should be used when retrieving items stored at - 80oC or in Liquid Nitrogen. They must never be immersed in liquid nitrogen as they will absorb the liquid and result in serious burns to the user.  *Rubber* gloves are for use when washing up, where no chemical hazards are present.  *Leathe*r heat-proof gloves are strongly recommended for use when removing material from the microwave/autoclave, laboratory ovens and for protection from hot objects. These gloves are not waterproof and will absorb any fluid spills but not transfer the heat to the user. | A close-up of a hand  Description automatically generated with low confidenceA picture containing handwear, clothing  Description automatically generatedA pair of gloves  Description automatically generated with low confidenceA picture containing handwear  Description automatically generatedA picture containing handwear, clothing  Description automatically generated |

# Risk Management

Risk Management is the process of recognising situations that have the potential to cause harm to people and/or property and then doing something to prevent the situation from occurring or minimising its effect if it must occur. Records of all Risk Management are kept in the Procedure folder.

## The Risk Management Process

Risk management follows a standardised process consisting of well-defined steps that lead to informed decisions about controlling the impact of the hazard. These steps are:

1. Hazard/Risk identification
2. Risk Assessment
3. Risk Control
4. Hazard/Risk Review

### STEP 1 Hazard/Risk Identification

Hazard identification is the part of the process used to evaluate if the situation or item may have the potential to cause harm.

### STEP 2 Risk Assessment

Risk assessments of all identified hazards should be evaluated using the [University of Newcastle Risk Assessment Matrix](https://www.newcastle.edu.au/__data/assets/word_doc/0018/82035/risk-assessment-template-17-Aug-2015_Final-V7.doc) as this provides a consistent way of assessing hazards and helps prioritise these hazards to have controls developed to minimise or eliminate the risk from the hazard. The outcome of these Risk Assessments and their related SOPs are in the Procedures Folder.

### STEP 3 Risk Control

Once the risk arising from each hazard has been assessed, then the hierarchy of controls should be applied to eliminate, reduce or manage the risk associated with the hazard.

Figure 3 Risk Management – Hierarchy of Controls

Controls should be considered in the order shown above and the questions below considered.

|  |  |
| --- | --- |
| Elimination | Can the hazard/risk be removed? |
| Substitution | Can a method or material of a lower overall risk be used? |
| Isolation | Can the hazard/risk be completely contained during the work? |
| Engineering controls | Can a barrier be placed between the worker and the hazard, or can the hazardous substance be removed through air ventilation? e.g. use a biological safety cabinet |
| Administrative controls | Can the hazard be controlled through rules, procedures and practices? e.g. rules like safety glasses must be worn |
| Personal Protective Equipment | Can the hazard be controlled by providing equipment that protects the individual when worn e.g. laboratory coats and gloves. |

### STEP 4 Hazard/Risk Review

A review process must be put in place to ensure that the controls that have been agreed upon are efficient and effective. It is also the time to ensure that no new hazards have been introduced by the controls that have been implemented.

All SOPs and Risk Assessments must be reviewed at a minimum every two years.

## University Safety Review Process

All laboratory activities involving potential risks from materials, equipment or the activity itself must undergo a formal safety review prior to any activities commencing on site. There are two levels of review – Local review and Escalated review.

Refer to Appendix C – University Safety Review Guideline to obtain a clearer understanding of this process.

All researchers should be familiar with the contents of their Safety Review Applications and the University H&S approval conditions for the project they are working on. When changes to the activity are required, then a variation to the safety approval must be submitted and approval gained for this variation.

### Safety Review Application

Applications for safety clearance can be found on the University of Newcastle Health and Safety website: <http://www.newcastle.edu.au/current-staff/teaching-and-research/health-and-safety-for-teaching-and-research>

## University Ethics Approval Processes

Projects which involve human or animal participants MUST obtain ethics approvals prior to any activities commencing. Like safety approval, if there are any changes to the planned activity, then a variation must be prepared, submitted and approved prior to this change being implemented.

### Animal Ethics Application

Applications for animal ethics approval can be accessed on the University of Newcastle website: <http://www.newcastle.edu.au/research-and-innovation/resources/animal-ethics/about-us>

### Human Ethics Application

Applications for human ethics approvals can be accessed on the University of Newcastle website: <http://www.newcastle.edu.au/research-and-innovation/resources/human-ethics/about-us>

# General Laboratory Safety Guidelines

## Housekeeping

Good housekeeping helps prevent incidents and injuries, particularly slips, trips and falls and is everyone’s responsibility.

* Keep corridors and doorways clear and ensure clear and defined pathways are maintained.

Exercise care when opening and closing doors and entering or leaving areas.

* Keep all emergency egress routes completely clear at all times.
* Keep only the minimum required quantities of chemicals in the laboratory area.
* Secure gas cylinders upright to prevent tipping or falling and only those cylinders attached to apparatus are to be stored in the laboratory.
* Label all safety equipment and maintain in good operating condition.
* Clean up spills immediately and thoroughly using appropriate equipment and materials. If you are unable to rectify the situation, the Laboratory Manager / Technical Coordinator / Technical Officer should be immediately informed and the area barricaded off to prevent exposure or other risk.
* All laboratory waste must be properly disposed of in the correct manner as per the Waste Management Plan.
* Keep work areas free from clutter. Clean up work surfaces after each project or at the end of each day. Ensure that any chemicals, materials or equipment not in immediate use are properly stored.
* Hand-washing sinks must only be used to wash hands in. They must be kept clean and not be used for any other purpose.
* Floors are to be kept tidy and dry.
* Ensure signage for all safety equipment is visible and in good condition.
* All chemical containers must be properly labelled.
* Unattended operating equipment must display an “Unattended Experiment Notice” sign.

## Electrical Safety

### Double adapters / Power boards

The University has banned the use of double adapters (“piggyback plugs”). The use of power boards is not encouraged, however there will be occasions when there are not sufficient wall outlets for requirements. Any power board used must have a 10-amp overload protection and have individually switched outlets.

### Caution

Exercise caution when using electricity in the laboratory. Be aware of equipment or leads that maybe close to any areas where liquids are used. Keep leads and extensions tidy and away from walkways.

### Report Concerns

Contact Infrastructure and Facilities Services (IFS) and report any related concerns. Any hazard involving electricity should be isolated and reported to the [Laboratory Manager / Technical Coordinator / Technical Officer].

### Test and Tagging of Electrical Equipment

Infrastructure & Facilities Services (IFS) conduct annual test and tagging of laboratory equipment as per AS/NZS 3760. A notification is sent to building personnel to advise when this service will be provided. It is then up to the lab personnel to ensure that all equipment is available for testing.

If additional testing is required or equipment safety tag is found to have expired, this can be arranged via a Maximo request.

Always check for a valid electrical safety tag prior to using equipment. If it is found to be out-of-date, report this to the Laboratory Manager / Technical Coordinator / Technical Officer and have the equipment placed out of service.

Equipment that shows obvious damage to its power cable **MUST NOT BE USED.** It must be reported to the Laboratory Manger / Technical Coordinator / Technical Officer and checked for electrical safety. **DO NOT** tape up a damaged lead.

***Out-of-test equipment must never be used under the assumption it is safe****.*

## Equipment Hazards

Equipment Hazards are associated with working near or on laboratory equipment. They vary depending on the equipment used. All equipment should be maintained (as per manufacturer’s recommendations or as per statutory compliance) to ensure it is safe to use and maintenance records kept in the Equipment Folder.

Other issues to consider can include exposure to:

* moving parts (e.g. risk of injuries from entanglement, friction, abrasion, cutting, severing, shearing, stabbing, puncturing, impact, crushing, drawing-in or trapping, etc.)
* energy (e.g. electrical, electromagnetic, magnetic, etc.)
* heat or cold
* noise and/or vibration
* radiation
* gas or liquid under pressure (e.g. injuries from injection or ejection by hydraulic systems, pneumatic systems, compressed air, paint sprayers, etc.)
* psychosocial hazards (e.g. stress, job content, work organization, cognitive factors, etc.)

Before using equipment for the first time, ask for assistance and refer to the procedure for this equipment item. Each piece of equipment used in the laboratory should have an associated risk assessment and procedure to guide its safe operation.

For any equipment other than simple benchtop devices, you will need to complete training and be deemed competent before being allowed to use that equipment. Records of training must be completed and retained.

All equipment faults and problems must be reported immediately to the Laboratory Manager / Technical Coordinator / Technical Officer. If a piece of equipment is unsafe, remove its electrical lead from the power point and ensure that an ‘OUT OF SERVICE’ sign is placed on the equipment immediately, so that no-one else attempts to use it.

The laboratory uses a range of equipment (listed in the equipment register) and can be used in a variety of ways. Risk assessments have been conducted for each piece of equipment and each situation has been considered. If it was deemed advisable to involve specialised/technical expertise (i.e. engineer, safety professional, manufacturer, etc), this should be done during the Risk Assessment process.

The hazards that were identified have an SOP for that activity and will be found in the Procedures Folder.

## Working Alone

Generally, working alone in a laboratory does not increase the risk of being injured, however it does create issues for seeking support should an incident occur, especially if this were outside core business hours.

In this laboratory if you are Working Alone [insert the rule for working alone]

## Working After Hours

The laboratory does not encourage any worker to work outside of core hours. If this is considered necessary, then it must under all circumstances be authorised. In the first instance the Laboratory Manager / Technical Coordinator / Technical Officer should be consulted, and working after-hours be authorised by [name of authorising person]. There is strictly no working alone after hour. A ‘buddy’ who is inducted into the laboratory must always be present.

All workers who are authorised to work outside core hours must check-in with Security prior to beginning work and checkout prior to leaving campus.

## Ergonomics

Ergonomic risk factors include situations that cause wear and tear on the body and can cause injury. These include repetition, awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, and work stress. In the laboratory these may come from standing at a piece of equipment or bench for extended periods or from strenuous work. Ergonomic hazards should be considered and included in the risk assessment and SOP for each activity.

Some common laboratory activities that have some specific ergonomic impacts are:

### Manual Handling

Manual handling means **using your body to exert force** to handle, support or restrain any object, including people or animals. It is not just lifting or carrying heavy objects. Manual handling includes lifting, pushing, pulling, holding, lowering, throwing, carrying, packing, assembling, cleaning, sorting and using tools.

The term is not limited to handling heavy objects. Pushing a trolley or using a keyboard are both examples of manual handling.

Any manual handling activity should have an associated risk assessment and SOP in the Procedures Folders.

Trolleys and Lifting aids are available for use by laboratory personnel and can be found at:

* [Lifting aid name and location. Does it require any special training or licensing to use?]

A University guide to manual handling is provided as Appendix D.

### Pipetting

Excessive and incorrect use of pipettes can result in finger, arm and shoulder injuries. If you are undertaking frequent pipette use or are experiencing discomfort, consult the relevant Instruction Manuals for the correct use and risk reduction. In such instances, a more ergonometric or user-friendly pipette may need to be sought. Report all complaints and suspected injury to your Technical Coordinator / Technical Officer and employer via the Incident Reporting System.

### Microscopes

Microscopes should be used only when seated. Ensure that there is ample legroom, use a comfortable chair with adequate lumbar, thigh and foot support. Try to avoid prolonged use of the microscope, take short breaks to rest the eyes and ensure that the light intensity is not excessive.

### Laboratory Chairs

Sitting for long periods of time on laboratory chairs may cause lower back problems. Chairs have several points of adjustment and should be adjusted to the requirements of individual users. Stand and stretch at regular intervals to avoid problems. Refer to the [Information Sheet](http://www.newcastle.edu.au/__data/assets/pdf_file/0020/200846/Ergonoimc-advice.pdf) about correct ergonomic workstation set-up and exercises to perform during work-breaks.

Ergonomic assessments should be conducted in the first instance by completing the online discover module – [Workstation Ergonomics](https://discover.newcastle.edu.au/course/view.php?id=93). If after completing the module, the problem cannot be resolved, contact the [University Health, Safety and Wellbeing Team](mailto:usafe@newcastle.edu.au) and arrange an on-site assessment.

### Adequate Lighting

The SafeWork NSW Code of Practice “Managing the work environment and facilities” gives recommended illumination levels for various tasks. If there is a concern over the level of lighting, contact Infrastructure and Facilities Services (IFS) to discuss solutions. In the case of a broken bulb, light not working, buzzing noise or flickering notify IFS via a MAXIMO request.

### Adequate Ventilation

Fume hoods must be utilised when working with any chemical substances that may be hazardous via inhalation; or absorption; or that have a strong or unpleasant odour. Where this is not possible, appropriate alternative strategies must be approved by the University of Newcastle Chemical and Radiation Technical Committee (CRTC) prior to implementation. Any problems with Laboratory air supply should be reported to Infrastructure and Facilities Services (IFS).

### Noise

The national standard for exposure to noise in the occupational environment is an average daily exposure level of 85 decibels. This is consistent with overwhelming scientific evidence which indicates that exposure levels above 85 decibels represent an unacceptable risk to the hearing of those exposed. Many other developed countries have introduced legislation based on this standard. For peak noise, the national standard is a peak sound pressure level of 140 decibels.

Hearing protection must be used if laboratory noise levels exceed those as stated in the Workplace Australia document, [National Standard Occupational Noise [NOHSC: 1007 (2000)](https://www.safeworkaustralia.gov.au/system/files/documents/1702/nationalstandardforoccupationalnoise_nohsc1007-2000_pdf.pdf)

A framework for management of exposure to noise is provided by the SafeWork NSW Code of Practice Managing noise and preventing hearing loss.

Ensure that both the worker producing the noise, and any other persons within the immediate area are protected. Hearing protection must be worn when using a sonicator. If you have any concerns about laboratory noise levels, consult Infrastructure and Facilities Services (IFS).

## Safety Signage and Emergency Equipment

### Safety Signs

Safety signage is displayed throughout the building indicating the location of safety equipment and emergency exits. NEVER remove or conceal a safety sign. Immediately report any damaged or missing signs to Infrastructure and Facilities Services (IFS) via Maximo.

### Safety Equipment / Certification Signage

Infrastructure and Facilities Services (IFS) are responsible for the maintenance and operation (including testing and certification where applicable) of the fire extinguishers, fire hoses, safety showers/eye wash stations, autoclaves and fume cupboards.

Other safety equipment such as Biosafety cabinets and cytotoxic cabinets fall under the responsibility of the users to ensure regular servicing and certification is undertaken.

### Hand-Washing Sinks

Hand-washing sinks must only be used to wash hands. They must be kept clean and not be used for any other purpose.

Refer to Appendix F for correct hand washing technique.

### Safety Showers / Eyewash Stations

Ensure you know the location of safety showers/eyewash stations. These are used in emergencies such as chemical splashes or burns.

Never place anything under or near a safety shower that may impede its use during an emergency. Report all incidents of use via the Incident Reporting System.

NB: Use of the safety showers will result in wet floor around the area of use. Infrastructure and Facilities Services (IFS) should be notified, if required, to mop up the excess build-up of water on the floor. Otherwise mop up any water as soon as possible and identify the area using ‘CAUTION WET FLOOR’ signage.

### Diphoterine

An emergency rinsing solution for splashes of chemical products. Its rapid use in case of contact between the skin or eye and a chemical product is intended to quickly eliminate the residual chemical product on the skin or in the eye.

## Vaccination

It is recommended that personnel handling human blood/body fluids be immunised against Hepatitis B (with a test to confirm seroconversion) and if handling animals be immunized against Tetanus. Consult your own doctor or your employer’s recommended medical service.

The Institutional Biosafety Committee (IBC) may also make specific recommendations for immunisation or health surveillance as part of the approval for research projects.

In addition, the Department of Health now requires any personnel who work or spend time at a Department of Health site such as a hospital site, to have the same immunisation as would an employee at that site doing similar work. Either vaccination or positive serological testing is required to prove immunity to relevant organisms. An approved Vaccination card must be filled in for such personnel, which has been attested by the relevant physician who has either administered the vaccine or received the result of serological testing.

# Chemical Safety in Laboratories

[Modify the below section as required to reflect the activities of your laboratory]

## Relevant Australian Standard

For further information refer to AS2243.2:2006 Safety in Laboratories, Part.2 – Chemical aspects; AS2243.8:2014 Safety in Laboratories Part 8 Fume cupboards; AS2243.10:2004 Safety in Laboratories Part 10 Storage of chemicals; AS 1940 The storage and handling of flammable and combustible liquids.

## Prohibited Carcinogens, Restricted Carcinogens and Restricted Hazardous Chemicals

These substances are listed in Schedule 10 of the [NSW Work Health and Safety Regulation 2017](https://www.legislation.nsw.gov.au/#/view/regulation/2017/404/sch10). Use of these substances is strictly controlled and can only be undertaken in full compliance with the requirements of this legislation. Employers are required to keep records of employees exposed or potentially exposed to these substances.

## Chemical Hazard Identification and Control

The NSW Work Health and Safety Regulation 2017 states that “a person conducting a business or undertaking must manage “…risks to health and safety associated with using, handling, generating or storing a hazardous chemical at a workplace”. Risk analysis relating to the use of hazardous substances in laboratory procedures must be undertaken and documented; detailing the hazard identification and the controls required for all hazardous chemicals used in each laboratory procedure to demonstrate the management of risk.

## Safety Precautions

### Training

All laboratory personnel working with chemicals are required to complete the University of Newcastle’s online Chemical Safety Training – in Discover.

In addition, the University of Newcastle offers courses in the use of the online chemical database, Chemwatch. Each laboratory group must have a person responsible for keeping this up to date for the group. The Laboratory Manager / Technical Coordinator / Technical Officer will be able to provide you with further information about Hazardous Chemicals Training and training in dealing with chemical spills.

### Purchasing Chemicals

Although it may be more economical, it is inadvisable to purchase large volumes of chemicals for the sole purpose of saving money. It is recommended to purchase quantities to be used over a given period, or for a specific series of experiments. Over time, if excess chemical has not been used, it may become suspect due to its age and represent a hazard requiring disposal. Depending on the chemical, the cost of its disposal may counter the savings made in the first place. Therefore, unless a chemical is used constantly, procurement of minimal amounts is advised.

*Note: The quantities of chemicals purchased may be restricted by commitments made as part of the University Safety Review process for research projects.*

### Safety Data Sheets (SDSs)

The NSW Work Health and Safety Regulation 2017 requires that current Safety Data Sheets are obtained for hazardous chemicals not later than when the chemical is first supplied for use in the workplace. If the person is not able to obtain the SDS as above, then as soon as practicable after the chemical is supplied and prior to the hazardous chemical being used in the workplace. When dealing with an SDS be aware that:

1. The SDS provides important information on chemicals, includes details on safe use, storage and disposal.
2. Most SDSs can be obtained from Chemwatch – the University’s online chemical database. If the manufacturer’s SDS for a new chemical is not already available from Chemwatch, then send a copy of the SDs to Health and Safety so that it can be uploaded. By doing this, the Chemwatch system retains its relevance as a repository for your chemicals.
3. Suppliers are legally obliged to provide an SDS for any hazardous chemical which they supply. This can often be obtained via an internet website or by contacting the supplier. This should be done when placing the order.
4. All SDSs must be reviewed by manufacturers and importers of hazardous chemicals and update any SDS they produce at least every five years. Current SDSs should be GHS compliant.
5. SDSs obtained from suppliers must never be altered. Extra information may be appended but it must be clearly marked as such.
6. SDSs must be consulted before using hazardous or unfamiliar chemicals so that the user is informed about possible health effects, correct spill procedures and recommended personal protective equipment.
7. Whilst it is not required to retain a physical copy of all SDSs in the laboratory so long as electronic access can be achieved. However, a physical copy of SDSs for higher risk chemicals should be available for rapid reference in the case of an incident with that chemical.

*Note: Chemwatch is a net-based database that contains information on thousands of chemicals. It provides all the details found in an SDS but also has other features includes technical articles and Legislation.*

*University staff and students can access* [*Chemwatch*](https://jr‐chemwatch‐net.ezproxy.newcastle.edu.au/chemwatch.web/home) *from the University’s online library database. All staff and students with access will be able to source an SDS in this way.*

### Chemical Manifest

Chemwatch is also used to maintain the University’s Chemical Manifest. The maximum quantities of all the chemicals and gases located in this laboratory are entered into Chemwatch and provide the chemical register for this area. Access to this part of Chemwatch is restricted to those people who maintain the manifest. Access is arranged via the Chemwatch administrator by contacting the Health and Safety team.

It is the responsibility of each laboratory to ensure the Chemwatch manifest is up-to-date with all hazardous chemicals belonging to that group and that this manifest is regularly updated to reflect the type and quantities of materials belonging to that group.

The Responsible officer within each laboratory must update the manifest as and when additional hazardous chemicals are introduced to the laboratory or if there is a change in volumes held of existing chemicals.

## Laboratory Gases

Compressed, liquefied or dissolved gases are categorised as Class 2 dangerous goods and subcategorised as:

|  |  |
| --- | --- |
| Class 2.1 | Flammable gases (e.g. Acetylene) |
| Class 2.2 | Non-flammable and non-toxic gases (e.g. Argon) |
| Class 2.3 | Poisonous gases (e.g. Ammonia), less likely found in the laboratory |

In instances where the gas presents multiple hazards, additional diamonds indicate the subsidiary risks, e.g. Oxygen - Class 2.2 (Non-Flammable, Non-toxic) and Class 5.1 (oxidising agent)

Laboratory gases can be hazardous to person and property and should be subject to a risk assessment in the Procedure folder. The potential hazards to be considered are:

* The possibility of pressure build-up in the regulator, which may then explode and ignite.
* The spread of hazardous fumes or flammable vapor into the laboratory by a leaking cylinder.
* The possibility of a cylinder becoming a projectile if it falls over and is damaged
* Manual handling issues due to the weight and size of cylinders
* [The nature of the gas itself (is it flammable or oxygen depleting, etc?)]
* [Transportation of the gas cylinders]
* [Storage of the gas cylinders]
* [Gas cylinder restraints]
* [Safety of the gas cylinder (age of the cylinder, labelling, etc) and auxiliary equipment (e.g. welding hoses, regulators and flashback arrestors)]

Only equipment specifically designed for use with gas cylinders should ever be used. It is also important to be sure that attachments are compatible with the cylinder intended for use.

Staff / students must be trained in the safe use of Gas Cylinders.

### Gas Cylinders

* Gas cylinders in the laboratory must be secured in an upright position by separate chains or straps to prevent them falling only.
* Only gas cylinders which are connected to an instrument (or a regulator) may be located within a laboratory area.
* All other cylinders including spares and empty cylinders must be stored in an upright position in the appropriate Gas Store where they also must be secured by chains or straps.
* Cylinders must be transported (whether empty or full) via use of a dedicated cylinder trolley. Never move a cylinder by rolling its base across the floor.
* If a leak occurs, the cylinder valve should be closed. If the valve cannot be shut off, and if safe to do so, move the cylinder to a safe position outside the building and contact IFS and the supplier. If it is considered unsafe to move the cylinder and a danger to occupants in the building due to the gas leak (i.e. hazardous or flammable) then the building must be evacuated and emergency services contacted.
* After closing off a cylinder, always allow residual gas to drain from the regulator head before turning the regulator flow valve off. If a regulator is full of gas when the cylinder is next turned on, the ensuing pressure build-up may damage the regulator diaphragm or cause it to blow out.

### Gas Sensors and Alarms

Any gases introduced into the laboratory should be assessed to determine whether the amount of gas in the cylinder could present a risk to the health and safety of the occupants if all of the contents were to escape into the laboratory room. If this is found to be the case, then one of the minimum requirements to control the hazard would be the installation of gas sensors and alarms to provide early warning if the gas was escaping into the space.

Ensure you are aware of the operation of these sensors and the actions to be taken when an alarm sounds.

## Laboratory Chemicals

Exposure to chemicals commonly used in workplaces can lead to a variety of short and long-term health effects such as poisoning, skin rashes and disorders of the lung, kidney and liver.

Hazardous substances take many forms, including gas, powder, liquid, solid or dust. Manufacturers and importers of hazardous substances are legally obliged to include warning labels and Safety Data Sheets (found in the SDS folder) with their products. This information offers advice on safe handling practices.

### Chemical Classification System for Hazardous Substances

With the adoption of the National model Work Health and Safety (WHS) Regulations in 2012, a new system of chemical classification and hazard communication on labels and Safety Data Sheets (SDS), based on the Globally Harmonised System (GHS) of Classification and Labelling of Chemicals came into effect after December 31, 2016.

After 31 December 2016, all workplace chemicals manufactured after 1 January 2017 must be classified according to the GHS and labels and SDS must be updated. [WorkSafe Australia](https://www.safeworkaustralia.gov.au/topic/labelling-chemicals) details what this should look like. However, chemicals manufactured prior to 1st January 2017 can continue to be supplied without needing to meet the labelling requirements under the GHS (though the SDS still had to be updated), of the model Work Health and Safety Regulations. Transition to GHS revision 7 will commence 1 January 2021. A full two-year transitional period will follow from this date.

To classify chemicals refer the [SafeWork Australia documentation](https://www.safeworkaustralia.gov.au/classifying-chemicals).

*Note: the ADG Code (Australian Code for the Transport of Dangerous Goods by Road and Rail) still applies to the transport of dangerous goods by road or rail.*

### Chemical Storage

* Only chemical bottles in current use are to be stored in open laboratory areas. Dangerous Goods cabinets within the laboratory area should be used for hazardous chemicals in the according to their class. Do not store bottles on their sides.
* All larger quantities of chemicals and stock supplies must be stored in a Dangerous Goods Store. Storage compatibility must be checked before placing items in the Dangerous Goods store.
* All containers should be appropriately labelled, and the date of purchase and owner clearly marked on the container.
* Labelling of chemical containers must be in accordance with the [NSW Work Health and Safety Regulation 2017, Schedule 9 Part 3](https://legislation.nsw.gov.au/%23/view/regulation/2017/404/sch9) which details the requisite details to be included on a label depending on the size of the container and/or usage.
* All chemical containers must be properly sealed.  
  It is not acceptable to use containers such as beakers, flasks and bottles that are covered in aluminium foil or plastic wrap to store liquids. Bottles with fitted screw caps are required for liquid chemical storage to prevent spillage and the release of vapours.

***Specific chemical storage requirements:***

* + Oxidising Agents (Class 5.1) - should be segregated from combustible materials and stored in a non-combustible cabinet or in the Mixed Dangerous Goods Store.

*Note: incompatibilities exist between chemicals in Class 5.1, refer to SDS or suppliers for further information.*

* + Organic peroxides (Class 5.2) - These chemicals are highly reactive and flammable and must be stored in a cool place, at least 3 metres from all other Dangerous Goods and shielded from all heat sources.
  + Toxic Chemicals (Class 6.1) – should be stored in a Dangerous Goods Cabinet. Packages containing inorganic cyanides must not be stored with acids or in any other way that will allow reactions with incompatible chemicals.
  + Flammable liquids (Class 3) – should be stored in an approved flammable liquid cabinet.
  + Flammable solids (Class 4.1) must be stored separately.
  + Corrosive substances (Class 8) – should be stored in corrosives cabinets. They must be stored in a manner that will prevent reactions between acids and alkalis, acids and hypochlorites, acids and cyanides, acids and ‘Dangerous when wet’ chemicals (Class 4.3), oxidizing acids, combustible materials, and incompatible acids.
  + Unstable chemicals – must be segregated and stored in suitably identified cupboards.
  + Volatile and toxic materials – may require special storage (refer to SDS for details).

*Note: sometimes SDSs do not have adequate information and web searches for more information may be necessary.*

* + Explosive materials (Class 1) – must be stored as required by legislation.
  + Poisons and drugs must be stored in a lockable drugs cabinet, or Toxic chemicals cabinet as required in AS/NZS 2243.10 Safety in Laboratories – storage of chemicals, and according to the [NSW Poisons and Therapeutic Goods Regulation 2008](https://www.legislation.nsw.gov.au/view/html/inforce/current/sl-2008-0392).
  + Class 9 Dangerous goods (miscellaneous goods and articles) – e.g. dry ice, see AS/NZS 4681 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles.

### Transportation of Chemicals Within the Building

* + Chemicals must be transported to or from laboratory areas by use of a trolley and/or appropriate Winchester carry basket.
  + Chemicals must not be carried by hand to avoid the risk of being dropped and broken or spilt.

### Segregation of Incompatible Chemicals

* + Segregation of incompatible chemicals is required during transportation, storage and disposal to minimise the risks to persons or property.

### Refrigerated Storage of Flammables

* + **Domestic refrigerators must never be used to store flammable materials.**  
    Due to their confined airtight space a build-up of flammable or toxic vapours has the potential to cause serious injury or death.
  + Flammable chemicals requiring refrigeration should be stored in non-sparking refrigerators or cold rooms.

### Chemical Labelling

* The NSW Work Health and Safety Regulation 2017, Schedule 9 Part 3 specifies the information required for a *correctly labelled* chemical container.
* [SafeWork NSW Code of Practice - Labelling of workplace hazardous chemicals](https://www.safework.nsw.gov.au/__data/assets/pdf_file/0016/50083/Labelling-of-workplace-hazardous-chemicals-COP.pdf)
* The following table is a comparison of GHS and ADG pictograms:



Figure 4 GHS and ADG Comparison Chart

### Explosive and Unstable Substances (GHS Explosives, DG Class 1)

Common unstable substances used in the laboratory include:

acetylide; amine; oxide; azide; diazo; diazonium; fulminate; halates; N-haloamine; hydroperoxide; hypohalitenitrate; nitrite; nitro; ozonide; per-acid; nitrogen halides; perthalates; peroxides.

See AS/NZS 2243.2 Safety in Laboratories Part 2: Chemical aspects for information on unstable substances. This can be accessed electronically in the University of Newcastle library – SAI Global Standards online.

General guidelines for the use of unstable or explosive substances:

* + - * Assess the risk, and control the risk,
      * Always read the Safety Data Sheet before using these substances. If there is no SDS on-site obtain one from the supplier.
      * Face, eye protection and gloves should be worn. A fume hood may also be necessary as well as a safety screen.
      * A minimal amount of these substances should be kept onsite and they should be stored away from work areas.
      * Read all warning labels.
      * Exothermic reactions should be carefully controlled. Ensure that the reaction can be rapidly cooled if necessary. Excessive heat may cause the mixture to be sprayed or explode.
      * Plan ahead for the use of these substances and do not proceed with the work if unsure or not confident.
      * Do not use unless you have University Safety approval for their use.

### Flammables

(GHS classes: Flammable gases, Flammable aerosols, Flammable liquids, Flammable solids, Self-reacting substances and mixtures, Organic peroxides, Pyrophoric liquids, Pyrophoric gases, Self-heating substances and mixtures, Substances and mixtures which in contact with water, emit flammable gases; DG Class 2 (flammable gas), Class 3 (flammable liquid), Class 4 (flammable solid, spontaneously combusts, dangerous when wet).

Common flammable and combustible liquids used in the laboratory include acetone, butanol, ethanol, methyl ethyl ketone, diethyl ether, carbon disulphide, toluene, hexane and petroleum spirit.

It is important to refer to the SDS before handling flammable liquids. Information on the SDS will include flash point (the temperature at which a chemicals vapor becomes flammable in air), as well as health hazard and precautionary advice.

General guidelines for handling flammable liquids:

* + - * Do not store flammable liquids in the close proximity of ignition sources, such as Bunsen burners, heaters, power points etc.
      * Always decant flammable liquids in a well-ventilated area, away from ignition sources.
      * Ensure that flammable liquid containers are compatible with their contents and that they are in good condition. Replace any deteriorated containers immediately.
      * Ensure that the lids on flammable liquid containers are tightly sealed when not in use.
      * No more than 2.5L of a flammable liquid should be used at any time in a fume hood.
      * Extreme care must be taken when heating flammable liquids and the procedure should be risk assessed. Steam baths and water baths are preferable to hot plates. If a hot plate is used, be careful not to overheat the glassware as it may crack. Ensure that the hotplate is spark proof and thermostatically controlled.
      * Always dispose of any unwanted flammable liquids via the chemical waste pickup system.
* For further details on flammable liquids, including legal storage quantities, consult: [SafeWork Australia information](https://www.safework.nsw.gov.au/resource-library/hazardous-chemicals/placarding-for-storage-of-hazardous-chemicals) which refers to Schedule 11 of the WHS regulation. Laboratory groups must keep their quantities of hazardous chemicals updated on the Chemwatch manifest.

### Cyanide Compounds

University of Newcastle CRTC (Chemical and Radiation Technical Committee) clearance (via the University safety approval process) must be obtained prior to purchase and use.

The safe handling of cyanide compounds is based on the prevention of cyanide compounds from entering the body. Entry to the body can occur by: Ingestion, inhalation of dust or vapour, or absorption through the skin.

Before using any cyanide compounds conduct a risk assessment and consult the SDS

Cyanide compounds are Toxic and must be stored in a locked cabinet.

Cyanide compounds are considered potentially lethal substances and are contraindicated for laboratory use.

### Hydrofluoric Acid

University of Newcastle CRTC approval must be obtained prior to purchase and use.

Hydrofluoric acid is considered a potentially lethal substance and is contraindicated for laboratory use.

### Perchloric Acid

For guidelines on the use and safety issues concerning perchloric acid see the University Library Laboratory Safety Manual- electronic resource (CCH Australia IntelliConnect Serials).

High concentrations of perchloric acid may only be used in laboratories fitted with approved chemical scrubbing units in their fume cupboards.

University of Newcastle CRTC approval must be obtained prior to purchase and use.

### Cryogenic Materials

Before using any cryogenic material the University training in cryogenic materials must be completed. Also see AS 1894-1997 and Amdt 1 -1999 “The storage and handling of non-flammable cryogenic and refrigerated liquids. Cryogenic materials (e.g. liquid nitrogen and dry ice) must never be transported/stored in sealed containers as pressure build-up can cause explosion of the container.

### Carcinogenic and Highly Toxic Chemicals

Before using these chemicals read the SafeWork Australia document: [Guide to managing risks of exposure to carcinogens in the workplace](https://www.safeworkaustralia.gov.au/doc/guide-managing-risks-exposure-carcinogens-workplace).

Safety approval must be obtained prior to purchase and use. Certain carcinogenic chemicals are classified as Prohibited or Notifiable use only under Schedule 10 of the NSW Work Health and Safety Regulation 2017. SafeWork Australia has documentation that details [what hazardous chemicals](https://www.safeworkaustralia.gov.au/doc/hazardous-chemicals-requiring-health-monitoring) should be monitored, and what [monitoring to perform for cyclophosphamides](https://www.safeworkaustralia.gov.au/resources-and-publications/guidance-materials/health-monitoring-cyclophosphamide).

### Heavy Metals

A risk assessment including disposal should be carried out before using any of these compounds. These compounds must be identified and approved in the University Safety approval process prior to purchase. Specific procedures with regard to storage, handling and disposal must be designated during this approval process, details of which should be identified to all personnel at risk of handling or disposing of these materials.

### Scheduled Pharmaceuticals (S4, S4D, S7, S8, S9)

The storage, handling and disposal of Scheduled pharmaceuticals must comply with the [NSW Poisons and Therapeutic Goods Regulation 2008](https://www.legislation.nsw.gov.au/#/view/regulation/2008/392/whole). An authority must be obtained from NSW Health before using S8 and S9 drugs using the [correct form](https://www.health.nsw.gov.au/pharmaceutical/Documents/apdp.pdf). For S4D, S8 and S9 drugs drug registers must be maintained and twice-yearly drug inventories performed and recorded. The University of Newcastle has a [policy](https://policies.newcastle.edu.au/document/view-current.php?id=24) on the use of S4 and S8 drugs in animals.

### Chemical Exposure

Any occurrences of adverse exposure to hazardous chemicals should be reported via the University’s Incident Report System. The SDS for the chemical must be consulted for hazard and precautionary phrases.

### Chemical Safety Queries

Any queries on chemical safety should be referred to Laboratory Manager / Technical Coordinator / Technical Officer or the University’s Dangerous Goods Specialist in the Health and Safety team.

Further assistance may be provided by the University Chemical and Radiation Technical Committee (The University CRTC) via the health and safety unit [healthandsafety@newcastle.edu.au](https://uonstaff.sharepoint.com/sites/LabSafetyImprovementProgram/Shared%20Documents/General/11.%20Safety%20Documentation%20Review%20&%20Improvement/Lab%20Safety%20Manual/healthandsafety@newcastle.edu.au).

# Biological Safety in Laboratories

[Modify the below section as required to reflect the activities of your laboratory]

## Biosafety

Biosafety refers to the containment principles, technologies and practices that are implemented to prevent the unintentional exposure to biological agents and toxins, or their accidental release. In-house training in biosafety is offered at the University.

## Relevant Australian Standard and Legislation

For further information refer to AS2243.3:2010 – Safety in laboratories Part 3 – Microbiological safety and containment for information about pathogens and human and animal tissues, and the Gene technology Act 2000 and The Gene Technology Regulations 2001 (current version in force from 8 October 2019) for information about genetically manipulated organisms. The regulations can be found at: <http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/legislation-2> which is on the Office of the Gene Technology Regulator (OGTR) website.

## Biological Materials

Biological materials include:

* tissues and fluids - diagnostic/clinical/research specimens (any human, animal, plant or invertebrate material including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluids submitted for purposes of diagnosis or analysis).
* microorganisms - including protozoa and other parasites, fungi, archaea, bacteria, unicellular algae, viruses and viroids.
* genetically modified organisms (GMOs) - these can be animals, plants, micro-organisms.
* prions - proteinaceous infectious particles that lack nucleic acids, which can cause scrapie, mad cow disease and other related neurodegenerative diseases of humans and animals.

## Biological Containment

The combination of buildings, engineering function, equipment, and worker practices used to handle microorganisms and prions safely.

## Biological Materials Handling and Storage Guidelines:

1. Material must be clearly labelled (on the primary container):

* name of biological material
* date
* contact person and
* if the material is genetically modified the label must indicate it is a GMO.
* Hazard stickers must be displayed on the storage unit (incubator, freezer, dewar, or refrigerator) where biological material is stored.

1. The storage unit must be labelled to clearly show the name and contact details of the person responsible for the material contained so that the person can be contacted should any biological be spilled or lost.
2. Biological material must be kept in lockable storage in a secure area with restricted access.
3. Risk group 2 or genetically modified (GM) material stored outside PC2 facilities must be kept in locked freezers, dewars etc.
4. Storage of GMOs can be covered by:

* a GMO license (e.g. DNIR-Dealing Not involving Intentional Release);
* a notifiable low risk dealing (NLRD);
* an exempt dealing;
* or as part of a dealing listed on the GMO register.
* This must be notified to the Institutional Biosafety Committee through the University safety review process. Storage of GMO’s must be in full compliance with the Gene Technology Act 2000 and its Regulations.

1. Cultures of spore producing fungi must be sealed as appropriate to prevent dispersal.
2. Registers must be kept for stored biological material. Registers should include material identification, risk group classification, date stored, location and contact person.
3. Diagnostic/clinical/research specimens being stored prior to disposal, must be in a sealed bag or container. It is preferable to place items in a spill tray or within a second sealed bag or container to prevent leakage if the initial bag or container is damaged.

## Disposal of Biological Materials

1. Material that is no longer required must be disposed of promptly and appropriately.
2. Diagnostic / clinical/research specimens (as described above) are disposed into the contaminated waste stream (yellow biological waste bag).
3. Animal carcasses and large samples of animal tissue should be disposed through the Animal Services waste pickup.
4. Microorganisms including liquid and solid cultures must be inactivated prior to disposal. Common inactivation methods include autoclaving at 121oC or treatment with bleach or other disinfectant agents. Refer to section 12 of Standard AS/NZS 2243.3 for further information.
5. Articles or specimens contaminated with prions are resistant to most traditional methods of inactivation. Refer to 12.2.4 of Standard AS/NZS 2243.3 for further information.
6. Bagged biological waste must be double bagged with the outer bag sealed during transport, or placed in a secondary sealable, unbreakable container and transported to the biological waste bins (yellow wheely bins) for removal as Contaminated waste.

## Classification of Microorganisms

This information has been compiled from Section 3 of Standard AS/NZS 2243.3 Safety in Laboratories-microbiological aspects. For more information consult this reference directly.

All microorganisms and genetically modified microorganisms are classified into 1 of 4 Risk Groups. The group definitions are as follows:

* Risk Group 1 (low individual and community risk) - a microorganism that is unlikely to cause human or animal disease.
* Risk Group 2 (moderate individual risk, limited community risk) - a microorganism that is unlikely to be a significant risk to laboratory workers, the community, livestock, or the environment; laboratory exposures may cause infection, but effective treatment and preventive measures are available, and the risk of spread is limited.

*Note: some risk group 2 organisms may have particular risks (e.g. to foetus) and such risks must be determined for each micro-organism prior to use.*

* Risk Group 3 (high individual risk, limited community risk) - a microorganism that usually causes serious human or animal disease and may present a significant risk to laboratory workers. It could present a limited to moderate risk if spread in the community or the environment, but there are **usually effective preventive measures or treatment available**.
* Risk Group 4 (high individual and community risk) - a microorganism that usually produces life-threatening human or animal disease, represents a significant risk to laboratory workers and may be readily transmissible from one individual to another.

**Effective treatment and preventive measures are not usually available**.

NB Prior to the commencement of work with any microorganism, determine which Risk Group it belongs to and include this determination in the Safety application for this work.

## Classification of Facilities

Physical Containment (PC) Levels set out certain facility requirements for the use of pathogens. They are numbered from 1 to 4 and correspond to Risk Group numbering.

The OGTR uses a similar classification system, PC1, PC2 etc, but in some cases the OGTR PC2 is different to microbiological PC2 as the OGTR only requires inward airflow when microorganisms are considered to be risk Group 2 or higher as per AS/NZS 2243.

The following information has been compiled from sections 4 and 5 of this Standard. For more information consult this reference directly.

### Physical Containment Level 1 (PC 1)

This definition is taken from AS/NZS 2243, A PC1 laboratory or facility is suitable for work with microorganisms where the hazard levels are low, and where laboratory or facility personnel can be adequately protected by standard laboratory practice. This level of laboratory or facility with its practices and equipment is usually suitable for student and undergraduate teaching laboratories. The organisms used should generally be classified as Risk Group 1. Specimens that have been inactivated or fixed may be handled in PC1 facilities.

Laboratory personnel shall observe the work practices in AS/NZS 2243.1 as well as the following:

1. Access to the laboratory shall be limited to authorized personnel.
2. Food and drink provide a means of microbial contamination and items for personal consumption shall not be brought into the laboratory or stored in laboratory refrigerators. Eating, drinking, smoking, shaving and the application of cosmetics shall be prohibited in laboratories.

*Note 1: This includes offices within the containment facility boundary.*

*Note 2: The chewing of gum is also prohibited.*

1. PPE worn and used in the laboratory shall comply with the requirements in AS/NZS 2243.1. The minimum PPE worn and used in the laboratory shall be protective clothing to afford protection to the front part of the body, and closed shoes, i.e. footwear that covers the toes, upper foot and heels, unless lesser requirements can be justified by a risk assessment. Protective eyewear shall be worn if a risk assessment of the task requires it. See also Clause 11.2 for detailed information on PPE.

*Note: A rear-fastening gown is preferable PPE for the front part of the body.*

1. Minimize the production of aerosols, particularly where work is carried out on the open bench.
2. Minimize the dissemination of microbiological material while flaming a wire loop, by drawing the loop gradually from the cooler to the hotter parts of the Bunsen burner flame, or by using a hooded or an electric Bunsen burner.

*Note: Disposable loops may be used as an alternative.*

1. Clearly identify and date cultures. Minimize the time for which cultures are kept on the bench. Transfer them to a dedicated storage area, such as a refrigerator or part of a cold room.
2. Do not mouth pipette. Blowing out residual volumes from pipettes creates aerosols; do not use pipettes that require forced expulsion to deliver the nominal volume.
3. Diagnostic kits, control sera and products manufactured from microbiological sources shall be handled with care as infectious microorganisms may be still present.
4. Because airborne fungal spores can spread in a similar manner to aerosols, cover or seal cultures of spore-producing fungi as appropriate to prevent dispersal.
5. Ensure chemicals are stored in the laboratory in accordance with AS/NZS 2243.10.
6. Always use local exhaust ventilation or a fume cupboard when determined appropriate by a risk assessment of any work with toxic, volatile, corrosive or odoriferous substances.

*Note 1: BSCs are not designed for this purpose (see Clause 11.1).*

*Note 2: AS/NZS 2982 should be consulted for local exhaust ventilation requirements.*

1. Items such as door handles, fridges, telephones, keyboards, reading and writing materials shall be regularly decontaminated.
2. Decontaminate work benches at least daily and after all work involving microorganisms.
3. Staff shall be trained in the cleaning up of microbiological spills. Spills shall be contained, any affected personnel attended to and the area cleaned up and decontaminated with appropriate disinfectant (see Section 10).
4. Segregate wastes (e.g. broken glassware, biological and radioactive substances) and dispose of according to applicable regulations, using the most appropriate and effective method for the materials concerned (see also Section 13).
5. Remove laboratory gowns and decontaminate hands before moving to areas outside laboratories. Where personnel are moving directly to another laboratory that is not separated via public thoroughfare, they may continue to wear their laboratory gown, provided it is clean and free from contaminants.
6. Mobile phones and other electronic devices with earphones, e.g. MP3 players and i-Pods, and wireless headsets shall not be used at the laboratory bench as they may become contaminated with organisms and laboratory reagents.

*Note: Where contamination occurs or is suspected, decontamination must take place prior to removal of the device from the laboratory.*

### Physical Containment Level 2 (PC 2)

This containment level is required for any facility in which pathogens from Risk Group 2 are to be used. The following requirements have been copied from the AS/NZS 2243.3 Standard for PC2 Facilities (for a full list refer to the Standard):

1. Access to the laboratory shall be limited to authorised personnel.
2. PPE worn and used in the laboratory shall comply with the requirements in AS/NZS 2243.1. See also Clause 10.2 for detailed information on PPE.
3. Protective clothing to afford protection to the front part of the body shall be worn within the laboratory.

*Note: A rear-fastening gown is preferable. Laboratory gowns must be removed, and hands decontaminated before moving to areas outside the laboratory. There is a need to restrict access to the PC2 areas, including via lifts and stairs, preventing the use of laboratories as thoroughfares and ensuring that eating and drinking is prohibited in the entire PC2 area.*

1. Required Laboratory Practices:
   * Laboratory Gowns should be hung or stored individually to prevent cross- contamination or contamination of the inside of gowns.
   * Food and drink provide a means of microbial contamination and items for personal consumption shall not be brought into the laboratory or stored in laboratory refrigerators.
   * Eating, drinking, smoking, shaving and the application of cosmetics shall be prohibited in laboratories.

*Note: This includes offices within the containment facility boundary.*

* + Open spaces between and under benches, cabinets and equipment shall be accessible for cleaning to prevent build-up of material providing refuge for invertebrates and microorganisms.
  + Mouth-pipetting is forbidden. Blowing out residual volumes from pipettes creates aerosols. Pipettes that require forced expulsion to deliver the nominal volume should not be used.
  + Items such as door handles, fridges, telephones, keyboards, reading and writing materials shall be regularly decontaminated.
  + Biosafety cabinets do not offer protection from chemical hazards. A fume cupboard or cytotoxic cabinet must be used when determined appropriate by a risk assessment of any work with toxic, volatile, corrosive or odoriferous substances.

1. Preventing the dissemination of microorganisms:
   * The production of aerosols must be minimised, particularly where work is carried out on the open bench. Aerosol-producing procedures should be performed in a biosafety cabinet.
   * The dissemination of microbiological material while flaming a wire loop must be minimised by drawing the loop gradually from the cooler to the hotter parts of the Bunsen burner flame, or by using a hooded or an ‘electric’ Bunsen burner.

*Note: Disposable loops may be used as an alternative.*

* + Cultures must be clearly identified and dated. The time for which cultures are kept on the bench should be minimised.
  + Diagnostic kits, control sera and products manufactured from microbiological sources shall be handled with care as infectious microorganisms may be still present.
  + Because airborne fungal spores can spread in a similar manner to aerosols, cultures of spore producing fungi must be covered and sealed as appropriate to prevent spore dispersal.
  + Work benches must be decontaminated at least daily and following all work involving microorganisms.
  + If working with specimens containing microorganisms transmissible by the respiratory route or if the work produces a significant risk from the production of infectious aerosols, a biological safety cabinet shall be used.
  + Centrifuges: When infectious materials are used, a centrifuge fitted with either sealed rotors or sealed buckets shall be used.
  + Cytotoxic drug safety cabinets: A laminar flow cytotoxic drug safety cabinet (see also Clause 10.8) shall be provided if work involving prions is intended. Installation and use, including the decontamination of the safety cabinet shall be performed in accordance with the requirements of AS 2639 (This statement is from current standard AS/NZS 2243.3 but AS2639 has been superseded by AS/NZS 2252.6 which is also being updated).

1. Transportation and storage of microbiological materials
   * Where it is required to use the lift to transport infectious materials from one floor to another, e.g. to the autoclave on another floor, the infectious materials shall be double contained, by placing in a secondary sealable, unbreakable container for transport. Potentially contaminated laboratory gowns and gloves shall not be worn in lifts.
   * When situated outside the laboratory, freezers, refrigerators or other storage units used for holding microorganisms shall be locked and posted with the biological hazard symbol.

*Note: Where freezers or refrigerators are used by multiple personnel, it is recommended that the names and telephone numbers of all users are displayed on the front of the unit.*

1. Work practices:

* Laboratory doors shall be closed when the laboratory is operating.
* Instruction and training in handling infectious microorganisms shall be provided to laboratory personnel with regular updates, e.g. annually or when new information is obtained.
* When handling any human blood, serum, other body fluids and substances that are visibly contaminated with blood, the information outlined in the [NSW Health Blood-Borne Viruses](http://www.safework.nsw.gov.au/media/publications/health-and-safety?a=105085) document should be consulted.
* All clinical and diagnostic specimens shall be regarded as potentially hazardous.
* Leaking containers shall be handled in a biological safety cabinet and the outside of the container decontaminated. Where a replacement sample is readily obtained, the leaking specimen shall be decontaminated and discarded.
* The use of sharps such as syringes, needles and scalpels should be minimised, as sharps injuries constitute a large proportion of laboratory accidents.
* For manipulations of Risk Group 2 microorganisms, a biological safety cabinet or other equipment designed to contain aerosols shall be used. A period of at least 5 min shall be allowed for aerosols to settle before opening homogenizer or sonicator containers in a biological safety cabinet (BSC).

*Note: Large items of equipment can interfere with the airflow pattern in a Class II BSC and correct operation of the cabinet should be validated with the equipment in situ.*

* When working with infectious or potentially infectious prions, a laminar flow cytotoxic drug safety cabinet shall be used (see also Clause 10.8).
* Bacterial cultures shall not be actively sniffed for odours.

*Note: This has been a common cause of laboratory acquired infections.*

* Cultures of spore producing fungi should be sealed as appropriate to prevent spore dispersal.
* Any container of viable microorganisms, including any waste that may contain viable organisms, shall be transported outside the laboratory within a second unbreakable and closed container, which can be readily decontaminated.
* Potentially contaminated re-usable laboratory ware shall be collected and disinfected or decontaminated in accordance with Section 12 prior to washing and re-use. For chemical disinfection, pipettes shall be placed vertically in an appropriate disinfectant solution, tip-first and fully immersed, to minimize the production of aerosols. If pipettes are to be thermally decontaminated in a steam sterilizer, they shall be fully immersed, vertically in a fluid, such as a detergent.

*Note: Thermal decontamination of pipettes that are not fully immersed in a liquid, i.e. are empty, can only be achieved in a pre-vacuum steam sterilizer.*

* Appropriate eye protection shall be used to protect eyes from contaminated or hazardous materials or from ultraviolet light.
* Gloves shall be worn when working in a biological safety cabinet, when handling human blood and body fluids, and when conducting procedures with liquids that contain or potentially contain human Risk Group 2 microorganisms. These present a risk of spills or splashes that could otherwise result in direct skin contact.
* PPE shall be removed and hands decontaminated in a predetermined appropriate order, before leaving the laboratory.

*Note 1: The order is removal of gloves followed by hand decontamination, then removal of eye protection and laboratory gown followed by a second-hand decontamination.*

*Note 2: Appropriate protocols for laundering or decontaminating PPE should be implemented.*

* Laboratory staff shall advise maintenance and service personnel of the special microbiological hazards in the laboratory. All potentially contaminated equipment and adjacent surfaces shall be decontaminated prior to maintenance or removal from the area.

## Genetically Modified Organisms (GMOs)

### Gene Technology Act 2000

The procurement, handling and conduct of work with genetically modified organisms is strictly controlled under the Gene Technology Act, 2000 and The Gene Technology Regulations 2001 (last updated 2019). This Act provides a national scheme for the regulation of genetically modified organisms in Australia, in order to protect the health and safety of Australians and the Australian environment by identifying risks posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with genetically modified organisms.

All personnel working in certified PC2 facilities must do so in compliance with the relevant guideline:

* Guidelines for Certification of a Physical Containment Level 2 Laboratory Version 3.2 – Effective 1 March 2013
* Guidelines for certification of a Physical Containment Level 2 Animal Facility Version 3.2 – Effective 1 March 2013

### Application for IBC / OGTR approval

All persons planning work with genetically modified organisms must submit a safety review application for consideration by the Institutional Biosafety Committee (IBC) for assessment of approval to undertaking this work.

No undertakings with GMO’s may commence without assessment and approval from the University of Newcastle IBC and where applicable the Office of the Gene Technology Regulator (OGTR).

### Certification of Facility

Laboratories in which any genetically modified work is undertaken (including genetically modified animals and micro-organisms) must be certified by the OGTR prior to any GMOs being used in the facility. This includes PC1, PC2 and animal facilities of the University. If the facility in which such work is to be performed is not certified, then an application for certification must be made by contacting the University of Newcastle Health and Safety Unit.

### Appropriate Work Practices

Undertakings on GMO’s should be carried out using similar practices to those outlined above for Biological Safety. The major difference being that all materials contaminated by being in contact with micro-organism GMOs must be autoclaved or chemically disinfected prior to disposal or re-use. All containers of GMO’s must be labelled as such. Waste which has been treated may then be disposed of as ‘biological contaminated waste’.

*Note: all people working in OGTR-certified facilities must be aware of the current certification guidelines and the current OGTR regulations (effective from 8th October 2019). Research staff must also be aware of any additional project-specific requirements required by the University safety approval.*

### Guidelines for the Transport, Storage and Disposal of GMOs.

The OGTR publication “Guidelines for the Transport, Storage and Disposal of GMOs” must be observed.

### Breaches

Breaches of containment or breaches of the certification must be reported immediately to the University Health and Safety for notification to the University IBC and OGTR, and a University of Newcastle incident form completed.

## Clinical Specimens

Universal precautions (Standard precautions) are identified in:

* + 1. [NSW Health Blood-Borne Viruses](http://www.safework.nsw.gov.au/media/publications/health-and-safety?a=105085) document
    2. Refer also to AS/NZS 2243.3

All persons collecting, handling or analysing clinical specimens are required to refer to these documents prior to commencing any work; and to ensure that the procedures adopted are compliant with these guidelines.

All blood, blood products, body fluids and associated materials should be regarded as infectious and handled with the same precautions used when handling samples that are known to be infected with blood borne pathogens.

### Appropriate Work Practices

In addition to adopting Universal precautions, all undertakings with clinical specimens should be carried out using the practices outlined above for Biological Safety.

*Note: Human blood and body fluids must be handled in a PC2-microbiology facility or higher (see AS/NZS 2243.3).*

## Biological Incident

* The first response in any accident / emergency is to assess the situation and determine whether it is safe – refer to Section 2.7 Emergency Response / First Aid Response.
* In the case of a biological incident, the First Aid Officer should be called and then medical aid sought in all cases of injury or doubt. Injured persons should not be moved, unless in further danger, e.g. from fire, gases, until expert assurance is obtained that movement will not cause further injury.
* Where aerosols have been generated, the area should be evacuated, sealed and signs put up to prevent people entering the affected area.
* The University Health and Safety team should be notified of spills of pathogens or genetically manipulated organisms as advice from the IBC may be required.
* Allow time for particles to settle (1h to 24h depending on ventilation) before disinfecting all surfaces potentially contaminated. A basic biological spills kit (with procedure) is available in each main laboratory area. Remove protective clothing (if contaminated) and wash hands and arms with anti-microbial soap. Apply clean protective clothing (lab coat, gloves, safety glasses, surgical mask) and proceed with decontamination.
* Disinfection procedures for spills of infectious material should be rapidly effective and aim at containing the problem in the affected area. Spills, such as knocking over liquid cultures or dropping culture plates, should be treated with a general disinfectant as supplied in the spills kit. Carefully pour the solution around the spill, allowing it to mix gradually with the contaminated material. Avoid pouring the disinfectant directly onto the spill, as this can produce more aerosols. Paper towels soaked in disinfectant can be used to cover the area. Alternatively disinfectant granules supplied in the kits can be used to soak up and disinfect the material.
* Allow at least 30 min for the disinfectant to act.
* Using the same liquid disinfectant, wipe over surroundings likely to have been contaminated with aerosols.
* After another 30 min, the spillage and disinfectant should be carefully mopped up. If used the granules can be collected using the disposable pan and scoop supplied in the kit.
* Where a spillage of a specimen from a known or suspected Hepatitis B, Hepatitis C or HIV patient occurs, a fresh sodium hypochlorite solution (5000ppm) should be used. The biological spills kit contains tablets to be used to make an appropriate chlorine-based disinfectant. Waste materials that contain hypochlorite must not be autoclaved due to the subsequent production of toxic gas.
* Remove and autoclave protective clothing in an autoclavable biohazard bag before placing in dirty linen bags for laundering.
* A full report of any accident and measures taken, along with injury report and hazard notification (where applicable) must be made as soon as possible to the University Health and Safety team and through the university online incident reporting systems (AIMS).
* For more information on disinfectants refer to AS/NZS 2243.3. In general, dilute bleach and 70% ethanol (v/v) are suitable for use for disinfecting biological spills that might occur in the laboratory where materials will be of risk group 2 and not higher. The [optimal bactericidal concentration](https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html) (CDC link) of ethanol is 60-90% (v/v). Do not use large volumes of ethanol or use open flames (eg Bunsen burner) in biosafety cabinets. Viraclean is used in some laboratory areas and is an Australian government approved disinfectant for use against the SARS-CoV-2 virus that causes COVID-19.

*Note: if spills in a Biological Safety Cabinet are cleaned using dilute bleach the disinfected area must then be washed to remove any residual bleach to prevent corrosion of the metal cabinet*

## Disinfection

Reusable glassware etc., contaminated with microorganisms, must be disinfected or autoclaved before cleaning. Containers for contaminated materials must be readily distinguishable from those used for ordinary dirty glassware etc. Care must be taken to ensure that containers of disinfectants (e.g. for re-usable pipettes) are deep enough to permit contact of disinfectant with the whole of the contaminated surfaces. Containers for infected equipment should where appropriate be provided with lids and, should be autoclaved where possible before cleaning. They should be designed to entrap minimal air.

Before using any disinfectant, refer to its safety data sheet and ensure that the correct personal protective equipment is donned.

All disposal procedures should be described in the Safety Review Form to ensure such procedures and use of specific disinfectants are reviewed and approved.

## Animal Handling Safety

All persons working with animals at the University must be inducted into the relevant Animal Facility, be aware of the University’s [Animal Research Policy](https://policies.newcastle.edu.au/document/view-current.php?id=226), [Animal Hazards Procedure](https://policies.newcastle.edu.au/document/view-current.php?id=228) and be familiar with the facility procedures.

The following hazards are specific to working with animals and the risk should be assessed for all personnel working with animals.

Transport of live animals between areas should be made where possible in isolator cages covered with a clean cloth. Animal carcasses must be bagged for transport to the storage freezers. All genetically modified animals must be labelled as such during Animal transport and holding.

1. Bites/Scratches - can be minimised by correct animal handling techniques. Courses in animal handling are regularly conducted by the University Animal Services Unit. Animal house staff or experienced technical staff will also provide assistance on appropriate animal handling.
2. Allergies - Individuals exposed to animal allergens, such as animal dander, may develop allergies. All researchers using animals in their research should consult the University website <http://www.newcastle.edu.au/current-staff/teaching-and-research/health-and-safety-for-teaching-and-research/laboratory-safety> and read the information on Laboratory Animal Allergy (LAA).

All personnel working with animals must complete the LAA workers questionnaire and any symptoms of animal allergy must be reported via incident reporting and contact the University Health Service. These allergies may be life –threatening and should be assessed by a medical practitioner. Symptoms include nasal congestion and sneezing, itchy eyes and asthma like symptoms. Allergies to animal bedding and chemicals may also occur. Work practices are required which not only minimise the exposure to animal allergens for the person conducting the work, but also the potential exposure of any other person in the vicinity.

1. Zoonoses - are diseases that are transmissible from animals to humans. The risk of zoonoses from monitored Specific Pathogen Free animals is very small, however, contact with larger animals may have an increased risk. Avoiding bites and scratches and washing hands and arms thoroughly after contact with animals will greatly reduce the risk. If an illness develops a medical practitioner must be consulted.
2. Hazards associated with the use of S4 and S8 drugs and the operation of anaesthetic machines: All staff using anaesthetic machines must be trained in their use. Researchers using Scheduled drugs should read and adhere to the requirements of the [NSW Poisons and Therapeutic Goods Regulation 2008](https://www.legislation.nsw.gov.au/#/view/regulation/2008/392)

This regulation describes how drugs should be stored and disposed of and describes the records that must be kept of drug usage. Research groups handling drugs should have a drug manager who controls access to the drug and ensures the biannual inventories required by the regulations are performed.

# Radiation Hazards in Laboratories

[Modify the below section as required to reflect the activities of your laboratory]

Projects involving radiation (ionising and non-ionising) must have approval from the University Health and Safety. The radiation section of the Safety Review Form must be filled out and submitted. Safety of radiation work is assessed by the University Chemical and Radiation Technical Committee.

Any persons working with radioactive isotopes must undertake a Radiation Induction and be trained to work in a dedicated Radiation laboratory. All persons potentially exposed will be required to wear Radiation monitoring badges as part of a Health Surveillance Program.

The University Radiation Safety Manual must be read as part of the Radiation Induction.

<https://www.newcastle.edu.au/current-staff/teaching-and-research/health-and-safety-for-teaching-and-research/laboratory-safety>

Staff working with radioactive isotopes must be licensed and it is recommended post-graduate students are also licensed unless they are supervised directly at all times by a radiation license holder while conducting this work.

# Spills

[Modify the below section as required to reflect the activities of your laboratory]

A spill kit [or spill kits] is available in the laboratory to be used for absorbing spills and preventing increased contamination. The location of the spill kits is identified on the laboratory layout. Personnel should be shown the location of spill kits as part of their induction and be aware of this location prior to using any material that may require its use in an emergency event.

**All major spills must be reported to** [name of responsible person]**.**

In the event of a spill:

1. Assess the situation

Prior to responding to a spill, assess the situation and determine whether it is safe to deal with the spill yourself, or whether the area should be isolated or evacuated and additional resources required. This may be local assistance in the form of IFS, Laboratory Safety Officer, the University HSW (who may consult CRTC or IBC members) or may require external expert assistance such as HAZMAT.

1. Refer to the applicable Safety Data Sheets (SDS)

These contain details on action to be taken in the event of a spill for that specific substance and must be consulted before working with any new substance.

### Spill Kits

Chemical spill kits / large spill kits and biological spill kits can be found in the laboratory as identified in the laboratory layout. If unsure of their location the Laboratory Manager / Technical Coordinator / Technical Officer will be able to indicate their locations. Familiarise yourself with the location of these kits.

The following spill kit resources are available in this laboratory:

* [Chemical spill kit bins - which contain absorbent materials which are useful for liquid chemical spills and for large spills and include booms, absorbent cloths, absorbent sawdust, respirator, chemical gloves etc. Prior to using the respirator, ensure the filters are properly attached and the mask fitted correctly to the face and ensure the respirator is sanitized after use.]
* [Chemical spill kit bags – which contain absorbent materials for liquid chemical spills, small booms, absorbent cloths and instructions.]
* [Biological spill kits - which contain disinfectant, gloves, N95 mask and paper towelling, tongs and a procedure for biological spills inside or outside a biosafety cabinet.]
* [Additional pads]
* [Chemical protective gloves]

### Precautions

Always wear PPE comprising safety glasses, gloves (appropriate to spill type), lab coat and appropriate mask or respirator when dealing with any spill. Shoe covers may be needed or chemical-resistant boots. The equipment required may differ depending on the nature and extent of the spill. Refer to the sections above for chemical or biological spills.

Be careful when dealing with spills that involve broken glass. All broken glass must be disposed in a sharps container. If the glass has chemical contamination, then a new sharps bin should be used and the method of disposal of the sharps bin will depend upon the nature of the chemical contamination. i.e. if the chemical would be disposed of by collection by a licensed chemical waste contractor, then the sharps container should be isolated and then disposed in the same manner.

Ensure that other staff are made aware of the spill and where required restrict physical access to the spill site e.g. by displaying signs or posting other personnel to restrict access, to prevent anyone from slipping in or spreading the spill further or being exposed to aerosols or fumes.

### Encourage safety awareness when transporting / handling / storing chemical or infectious substances:

1. Always carry chemical Winchesters or other glass vessels in wire carry baskets or protective foam containers.
2. Containers of infectious material should be place in an unbreakable secondary container for transport.
3. Always use the lift (goods lift not passenger lift) as opposed to the stairs for transporting chemicals, especially those in larger or breakable containers.
4. Always put chemicals including acids and flammables away in their respective cabinets as soon as they are delivered, and whenever they are not being used. Never leave flammables or acids unattended on benches.
5. To prevent accidents always store large, heavy or glass vessels on low shelves.
6. Store hazardous chemicals in bunds or drip-trays to contain any spill should it occur.

*Note: for storage of flammable liquids in metal dangerous goods cupboards the shelves must be perforated to allow air movement and leakage directed to the lower compound. Corrosive dangerous goods cupboards can have plastic trays to contain spills.*

## Chemical Spill

### Spill Control

1. Don appropriate PPE – this may include a respirator with appropriate filters.
2. Control the source of the spill. e.g. cap bottles if required.
3. If spilt material is flammable, isolate all ignition sources by pressing the Red Emergency Isolation button in the laboratory. Remove other potential ignition sources such as mobile phones and/or pagers.
4. Further assess the nature of the spill. You should be familiar with the SDS’s of the chemicals that are used in your laboratory, and the risk level of chemical or infectious materials you are working with.
5. At this stage, if safe to do so, proceed to the ‘Contain’ section of this procedure.
6. Determine if it is a small spill that can be contained using material from the facility spill kit or if you will need to use the larger spill kit.
7. If required, evacuate the immediate area, and in some instances shutdown the air- conditioning system by contacting IFS, to prevent fumes spreading further through the building.
8. If evacuation is required, sound the evacuation alarm in your specific area and all personnel should leave the building, moving towards the designated evacuation point.

*Note: sounding of the evacuation alarm will result in a response from the Fire Brigade. Security must be notified of the nature of the emergency.*

1. Seek/administer first aid to any personnel affected.
2. Inform other personnel to keep clear of the spill.

### Contain The Spill

1. Only if the spill is safe enough to deal with:
2. Retrieve spill kit. PUT on appropriate PPE of gown/plastic apron, chemical resistant gloves, safety glasses, and don the respirator if required. Only people who have completed the chemical spills training (including instruction on how to fit the respirator) should do this.
3. Contain the spill, use booms, pillow or other appropriate absorbent materials to stop the spill spreading.
4. Do not let the spill enter the drains.
5. Refer to SDS for the appropriate actions to clean-up the spilt material and to decontaminate the area.

### Disposal

1. Place all contaminated absorbents in disposal bags or buckets. Disposal of materials used to mop up spills follows the same requirements as disposing of the chemical which was spilt – e.g. dispose via the tox-free collection system with appropriate labelling.
2. The University Health and Safety team may need to organise an additional chemical waste collection if the material cannot wait until the next scheduled monthly pickup.

## Biological Spills

Spills of viable microorganisms must be assessed for their level of infectious risk, concentration and location where the spill has occurred.

As a general rule, spills of 10ml or greater that occur outside a biological safety cabinet must be dealt with as per the SOP in the event of a significant biological spill. A procedure is also provided in the biological spill kit available in each main laboratory area.

Spills that occur inside a biological safety cabinet should be dealt with immediately.

Keep the cabinet **ON** during the following procedures:

1. Spills up to 1ml should be treated by wiping with paper towel and 70% alcohol or other disinfectant such as Viraclean or dilute bleach. Dispose of the contaminated paper towel in a yellow waste bag together with the gloves. Switch on the UV light for 15 minutes to ensure full decontamination.
2. For spills greater than 1ml, remove contaminated gloves and leave them inside the cabinet.
3. Remove protective clothing (if contaminated) and place in an autoclavable waste bag. Wash hands and arms with an anti-microbial soap, then put on a clean set of gloves and fresh gown.
4. Flood the spill area with disinfectant and leave it for 10 minutes.

*Note: there is a risk of fire when using flammable material and remove any potential ignition sources first.*

1. Remove excess fluid with paper towel and discard into a biohazard bag.

Discard all disposables, petri dishes and solid material associated with the spill into the same bag. Remember to put all contaminated sharps into a sharps bin.

1. Decontaminate all equipment, walls and work surface by swabbing them with 70% alcohol or other suitable disinfectant. Disinfect both sides of the front grille and if the spill has reached the sump floor, collect the spill with paper towel, disinfect, then wipe the surface with soapy water. Sodium hypochlorite solutions should not be used on metal surfaces. If hypochlorite is used for any reason (e.g. risk of ignition of highly flammable 70% ethanol) the metal must subsequently be cleaned with detergent and water and rinsed to remove any residual hypochlorite.
2. Do NOT autoclave waste containing hypochlorite solution (or other chemicals), it produces toxic gas.
3. Reassemble the cabinet, shut it down and irradiate with UV light for at least half an hour.
4. In the event of a massive spill, formaldehyde gas decontamination may be necessary before further use. Discuss this with the Laboratory Manager / Technical Coordinator / Technical Officer and IFS.

## Other Liquid Spills

Fluid spilled on floors should be assessed for Risk and if appropriate cleaned up immediately to prevent any injuries that may occur on a slippery floor. However, if the risk from the spill is assessed too high for immediate clean-up, the area should be evacuated.

When using any chemicals read the SDS beforehand for instruction on safe handling, disposal and action to be taken in the event of a spill. Familiarise yourself with the locations of Spill Kits throughout your laboratory area.

## Spill Follow-Up

All incidents must be reported to your manager and an Incident Report lodged with the University through the Online Incident Management system (AIMS). Larger spills may need to be notified directly to the Health and Safety team and to IFS.

Ensure that the contents of the spill kit are replaced.

# Waste Management

Waste management includes the collection, transport, treatment and disposal of waste, together with the monitoring and regulation of the waste management process.

In this laboratory waste can be broadly categorised into general, laboratory specific and recyclable waste. It is the responsibility of all laboratory users to ensure that waste is disposed of in the correct way:

## General Waste

Make sure only general waste, such as wastepaper and packaging products is collected in the general waste bins lined with grey/black plastic bags.

Within laboratory areas, paper waste should be assessed whether it is considered clean or contaminated and disposed appropriately. Clean paper waste can be disposed of as General Waste.

Clean cardboard boxes should be collapsed and placed next to the general waste bin for collection by the cleaners or taken directly to the appropriate skip bin, if there is one in the area.

General waste is collected daily by the cleaners.

## Laboratory Specific Waste

### Biologically Contaminated Waste

Biologically contaminated waste includes all laboratory-generated waste (other than General, Infectious or Genetically Modified Waste) which is potentially contaminated with biological material. All laboratories are required to use yellow contaminated waste bags as liners in laboratory bins (Syringe bodies, needles, broken glass, scalpel blades, cannulae and any other objects that may rupture plastic bags, must be disposed in a sharps bin).

A picture containing text

Description automatically generatedWet-bag liners (tough plasticized paper) may be placed inside the yellow plastic bags to enable the bins to be used for disposal of plastic pipettes. Such pipettes aren’t classified as sharps but would pierce the plastic bag if the wet-bag liner wasn’t in place. Once full, each yellow bag must be sealed and transferred into a yellow contaminated waste wheelie bin.

Any equipment for disposal that has come into contact with material of plant, microbial, animal or human origin should be handled as if contaminated (i.e. is a potential danger to humans, animals, agriculture or the environment) for the purpose of waste disposal.

When contaminated waste bins are full, they should be locked and transferred to the local collection point – [insert details] where they will be picked up by the waste provider. An empty bin should be collected from this location and brought back up to the lab.

### Sharps

Any sharp agent, such as glass pipettes, needles, broken glass, scalpel blades, syringe bodies and cannulae must be placed into sharps containers. These containers must not be filled past their indicator line. When full, the lid must be securely fitted and the whole container placed into a yellow contaminated waste wheelie bin.

Separate Sharps containers should be identified (by labelling) for use with infectious or genetically modified materials. These Sharps containers should be autoclaved prior to disposal as biowaste.

### Infectious / Genetically Modified Waste

Text

Description automatically generatedAll potentially infectious waste materials, including bacterial, viral and genetically modified material must be decontaminated before final disposal. Decontamination can be achieved by either chemical disinfection, or by autoclaving. Clear (semi-opaque) autoclave-safe waste bags that bear the Biohazard warning symbol are to be used for solid waste to be autoclaved. Ensure that the bags you use are suitable for autoclaving. Once solid waste has been autoclaved to make it safe, it can be placed into the yellow contaminated waste wheelie bin.

1. Contaminated broken glass and sharp objects contaminated with live pathogens should be placed in suitably labelled Sharps Containers which should be autoclaved prior to disposal. Ensure that such Sharps containers are suitable for autoclaving.
2. All sample remains from work with live pathogens or genetically modified micro-organisms, disposable equipment, animal faeces and bedding, should be regarded as contaminated. Wherever possible, contaminated wastes should be placed in containers which will not entrap air and be autoclaved before being discarded or incinerated.
3. Used plastic Petri dishes, culture bottles and tubes for disposal should be carefully placed in solid-bottomed containers (not wire baskets) or in (double) autoclave bags. After autoclaving they should be disposed of as contaminated waste.
4. Aerosol cans and other contaminated sealed containers which may explode on autoclaving or incineration should be surface sterilized only by chemical disinfection before discarding.

**Do not autoclave**.

1. Liquid Culture media or other liquid wastes which may contain viable organisms may either be autoclaved in suitable vessels *OR* chemically treated, prior to disposal down the sink with copious water.

**Do not combine chemical disinfection with autoclaving as toxic gases can be produced by the chemicals during the autoclave cycle.**

### Chemical Waste

Chemical waste must be disposed of in accordance with Safety Data Sheet (SDS) and the University safety clearance requirements. Other than wash solutions and decontaminated liquid cultures which can go down the sink, all other chemical waste must be collected and disposed via the chemical waste collection service as described on the University website: <http://www.newcastle.edu.au/current-staff/teaching-and-research/health-and-safety-for-teaching-and-research/laboratory-safety> in the chemicals and hazardous materials section.

All chemicals to be disposed must be recorded on the ‘Request for disposal’ sheets. A copy of the Toxfree request form should be placed with the chemicals. The University Health and Safety unit posts on its website the schedule for collection of all hazardous chemical waste by the University of Newcastle Chemical waste contractor Toxfree. All chemical waste must be stored in appropriate containers with Global Harmonisation System (GHS) labelling to match the contents. If the chemicals would normally be stored in a Dangerous Goods Cabinet than the chemical waste should be stored in a similar Dangerous Goods cabinet with shelf trays, or a bund system fitted.

#### Chemical Waste labelling

Refer to the SDS and ensure that the chemical is packaged according to its nature. Labelling must be done in compliance with SafeWork NSW Code of Practice - Labelling of workplace hazardous chemicals and individual containers need to have the following information:

1. The nature of the contents whether it is a single material or mixed. If mixed, then the major component or the component posing the greatest risk should determine the risk status, but all components should be named
2. The final volume
3. The name of a contact person responsible for the waste
4. The name of the Group generating the waste.
5. Name of Hazards e.g. toxic, flammable
6. Contact name and phone number.

### Non-hazardous solid chemical disposal

Dispose of as chemical waste (Toxfree collection). Do not dispose of into Contaminated Biowaste Bins.

### Cytotoxic Waste

Materials which have been contaminated with cytotoxic chemicals e.g. tubes containing cytotoxic residue or ethidium bromide gels, should be disposed into purple cytotoxic waste containers. The cytotoxic containers themselves are to be disposed of into Purple Cytotoxic waste wheelie bins. Non-sharp solid cytotoxic waste must be of disposed into purple cytotoxic waste bags and then to cytotoxic A picture containing text

Description automatically generatedA picture containing text

Description automatically generatedwheelie bins.

### Glass Waste

A picture containing text, box, building material

Description automatically generatedAny uncontaminated glass may be collected for disposal by cleaners. It must be packed into a cardboard box or lidded plastic bucket and labelled as either "glass for disposal" or "broken glass" and left with a note attached informing the cleaners to remove it.

**Glass for Disposal**

*Note: laboratory glass such as glass Winchesters, beakers, flasks etc cannot be re-cycled as they melt at higher temperature than domestic glass (drink bottles, jars etc). Drinking glasses, window glass and light globes also are not recyclable glass.*

All contaminated glass, both broken and unbroken, must be disposed in contaminated sharps bins.

### Aqueous Waste

The University’s Trade Waste Agreement with the Hunter Water Corporation prohibits the discharge of carcinogenic, mutagenic, toxic or harmful substances to the sewer; or of any infectious material which has not been disinfected. Aqueous waste must be between pH 6.5 – pH 10; and of a nature which cannot cause harm to the environment, or to any Hunter Water works.

Waste disposal is addressed on the University Safety Review Form and waste must only be disposed of via processes thus described and approved of by the University Health and Safety team.

### Animal Waste – Animal Bodies

Animal remains should be bagged in a thick black plastic body bag and sealed. The bag is then placed into a Bioresources Animal Cadaver freezer where it is stored prior to collection and incineration. Refer to the Animal Services Procedures for further information.

# References

AS 1319 Safety Signs for the Occupational Environment

AS 1894 The Storage and Handling of Non-Flammable Cryogenic and Refrigerated Liquids

AS/NZS 2243 Safety in Laboratories

AS/NZS 2243.1 Safety in Laboratories Part 1: Planning and Operational Aspects

AS/NZS 2243.10 Safety in Laboratories Part 10: Storage of Chemicals

AS/NZS 2243.2 Safety in Laboratories Part 2: Chemical Aspects

AS/NZS 2243.3 Safety in Laboratories Part 3: Microbiological Safety and Containment

AS/NZS 2252.6 Controlled Environments Part 6: Clean Workstations - Design, Installation and Use

AS/NZS 2982 Laboratory Design and Construction

AS/NZS 3760 In Service Safety Inspection and Testing of Electrical Equipment

AS/NZS 4681 The Storage and Handling of Class 9 (Miscellaneous) Dangerous Goods and Articles

[Commonwealth Gene Technology Act 2000 No 169](https://www.legislation.gov.au/Details/C2016C00792)

[Commonwealth Gene Technology Reg 2001 (106)](https://www.legislation.gov.au/Details/F2020C00957)

[National Occupational Health and Safety. Commission. National Standard. For Occupational Noise. [NOHSC: 1007(2000)]. 2nd Edition. July 2000](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiGse260un0AhXqR2wGHaHWCJQQFnoECAIQAQ&url=https%3A%2F%2Fwww.safeworkaustralia.gov.au%2Fsystem%2Ffiles%2Fdocuments%2F1702%2Fnationalstandardforoccupationalnoise_nohsc1007-2000_pdf.pdf&usg=AOvVaw0f2YDHrI6sNWtFi9LHKkQS)

[NSW EPA Waste Classification Guidelines](https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines)

[NSW Poison and Therapeutic Goods Act 1966 No 31](https://legislation.nsw.gov.au/view/whole/html/inforce/current/act-1966-031)

[NSW Poison and Therapeutic Goods Reg 2008](https://legislation.nsw.gov.au/view/whole/html/inforce/current/sl-2008-0392)

[NSW Work Health and Safety Act 2011 No 10](https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjho-2A5_rzAhWdzjgGHQ4uBoYQFnoECBAQAQ&url=https%3A%2F%2Flegislation.nsw.gov.au%2Fview%2Fhtml%2Finforce%2Fcurrent%2Fact-2011-010&usg=AOvVaw1ktibXh6wVdwlrFgCGBlWD)

[NSW Work Health and Safety Reg 2017 (404)](https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjo2fqV5_rzAhUs3jgGHU5ZDt4QFnoECAUQAQ&url=https%3A%2F%2Flegislation.nsw.gov.au%2Fview%2Fhtml%2Finforce%2Fcurrent%2Fsl-2017-0404&usg=AOvVaw178FQpMKf4qXm-VrgjqdI_)

[SafeWork NSW Code of Practice - Labelling of Workplace Hazardous Chemicals](https://www.safework.nsw.gov.au/__data/assets/pdf_file/0016/50083/Labelling-of-workplace-hazardous-chemicals-COP.pdf)

[SafeWork NSW Code of Practice - Managing Noise and Preventing Hearing Loss](https://www.safework.nsw.gov.au/__data/assets/pdf_file/0017/50075/Managing-noise-and-preventing-hearing-loss-at-work-COP.pdf)

[SafeWork NSW Code of Practice - Managing the Work Environment and Facilities](https://www.safework.nsw.gov.au/__data/assets/pdf_file/0016/50074/Managing-the-work-environment-and-facilities.pdf)

# REVIEW

This laboratory safety manual should be reviewed when changes are made to the laboratory, as an outcome of an incident review or at minimum every two years.

# DOCUMENT HISTORY

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Version** | **Details of changes** | **Reviewed by** | **Approved by** |
|  | Draft |  |  |  |
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# Appendix A – site specific laboratory Induction Checklist

This checklist is designed as an aid to inducting new personnel into the safety practices to be followed in [………………. …….] laboratory.

All personnel should have access to the Laboratory Safety Manual and be provided with explanations and demonstrations of its content. This shall occur before the person commences work in the laboratory.

Laboratory personnel are asked to verify they have received this information and may be asked to confirm that they have understood it by way of questioning and demonstration. This checklist represents a record of induction and should be kept in the Induction folder.

|  |  |  |  |
| --- | --- | --- | --- |
| Laboratory: |  | Supervisor: |  |
| Date: |  |

**Demonstrate and explain the operation of the laboratory:**

☐ the structure and layout

☐ the type of work

☐ normal hours of operation

☐ access requirements

☐ out of hours access and security procedures

**Introduce the key people and their roles:**

☐ [Lab Manager / Technical Coordinator / Technical Officer]

☐ first aid officer(s)

☐ co‑workers

☐ health and safety representative

☐ emergency warden(s)

**Conduct a lab walk-through:**

☐ key activity zones

☐ key equipment

☐ locations of PPE – gloves, gowns, safety glasses, respirator, face shields, ear protection etc,

☐ Issue PPE

☐ location of first aid kit

☐ location of eye wash and safety shower

☐ location of fire-fighting equipment

☐ location of spills kits and other emergency equipment

☐ location and purpose of safety documentation folders

☐ emergency exits and building assembly point

**Key safety information:**

☐ how to raise issues and receive feedback

☐ times and purpose of laboratory safety meetings

☐ incident reporting procedures, including:

☐ necessity of reporting hazards, near misses and incidents

☐ where to find reporting system (online)

☐ reporting broken or damaged equipment

☐ emergency procedures – including how to respond to an emergency alarm and any key activities which should be undertaken prior to exiting the lab

[Modify the checklist and include further induction categories to suit your specific laboratory]

**Demonstrate your workplace health and safety environment:**

☐ information on specific workplace hazards and controls

☐ fume cupboard operation

☐ biosafety cabinet operation

☐ XXXX

[Modify the checklist and include further induction categories to suit your specific laboratory such as]

e.g., *using particular equipment, receiving stock. List all that apply*☐ safe use and storage of hazardous substances, including:

☐ how to read a safety data sheet

☐ location of safety data sheets folder

☐ emergency procedures, e.g., eye wash locations

☐ safe use and storage of personal protective equipment (PPE), including:

☐ when and how to use PPE

☐ how to clean, maintain and store PPE

☐ report damaged PPE

**Explain your training:**

☐ first aid, fire safety and emergency procedures training

☐ hazard‑specific training (e.g. waste management, hazardous substances)

☐ on the job training in safe operating procedures (e.g. process for training – review risk assessment and SOP, demonstration by trainer, activity undertaken by trainee under the instruction of the trainer, assessment of competence prior to trainee undertaking activity without supervision)

☐ additional laboratory training courses or job-specific training (e.g. if a license or permit is required)]

**Explain your security:**

☐ for each worker and for their personal belongings

☐ procedures for the workplace buildings

**Conduct a follow-up review:**

☐ answer and ask questions

☐ repeat any training required or provide additional training if needed

☐ review work practices and procedures with the worker

**Comments/follow-up actions**

|  |
| --- |
|  |
|  |

**Induction Completed by:**

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

**Worker’s name and signature Supervisor’s name and signature**

# Appendix B – Training Record

|  |  |
| --- | --- |
| **[Laboratory name] Laboratory**  **TRAINING RECORD** | Uni LOGO_Alternate |

|  |  |
| --- | --- |
| Name |  |
| Supervisor |  |
| Unit |  |

The following provides a record of initial training and follow-up training in laboratory procedures and equipment operation procedures and confirms the appropriate level of competence has been achieved by the relevant person to undertake these activities without immediate oversight.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SOP# | SOP NAME | Competence confirmed by | DATE | RESTRICTIONS /FOLLOW-UP REQUIRED |
|  |  |  |  | [Competency, Licence, Etc] |
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# Appendix C – University Safety Review Guideline

Guide: level of safety assessment and review

**Safety Review Form – research, teaching activities**

|  |  |  |
| --- | --- | --- |
| **Overview** | | |
| The University of Newcastle has a duty of care under the NSW Work Health and Safety Act and Regulations 2011 to provide a safe and healthy working environment for staff, contractors, visitors and this duty of care also extends to our students. Meeting our duty of care requirements means that the University has to establish systems and procedures for identifying work related hazards, assessing the risks of the hazards and implementing appropriate risk controls. The Safety Review process that has been established for research, teaching and other activities is a risk control that enables us to protect staff and students from risks that may be associated with these activities.  There are two levels of health and safety assessment & review relating to research projects, teaching, and other university activities such as events, fieldwork or overseas placements prior to commencement.  The assessment and review process required depends on the hazards or risks identified for the activity – these are identified using the Safety Review Form. An escalated assessment level is required to meet legislated compliance requirements or high risks related to the hazards in the activity.Refer to Table 1 for the level of review required for specific activities and hazards/ risks.  Prior to each research project or other activity commencing an identification and assessment of the associated hazards is undertaken by the Chief Investigator, Research Supervisor, Course/Activity Supervisor/Co-ordinator or School /Faculty/Division staff member with the preparation of a safety review form. Depending on the outcome of this assessment the Safety Review Form may require escalation to the Health and Safety Team for further review and assessment in line with the following guidance and with reference to *Table 1.* | | |
| LOCAL OR NON-ESCALATED REVIEW  *Note: These reviews will not come to Health and Safety* | | * Undertaken as an initial assessment for both a project/activity which will require escalated review and for low-risk projects or other activities that do not require escalation. * Review is conducted by the Research Supervisor, Chief Investigator, Course/Activity Supervisor/Coordinator, The Local Safety Contact Person or other review mechanisms as determined by the local area may also assist in the review. |
|  | | |
| ESCALATED REVIEW | * The Safety Review Form is escalated to H&S Team following the assessment undertaken at a local level. (Email: SafetyClearance@newcastle.edu.au) * Depending on the hazards identified a number of review pathways may occur as outlined below:   + Review undertaken by a member of the H&S Team and/or referred to a technical specialist for review as required (e.g. Dive Officer) when high risk activities are identified in the Safety Review form.   + Review is undertaken by the technical Committee (Institutional Biosafety Committee or Chemical and Radiation Technical Committee), a technical specialist (Radiation Safety Advisor, Laser Safety Advisor, or other specialist or subject matter expert as required), the Deputy Vice-Chancellor (Research) or Deputy Vice-Chancellor (Academic) or The Vice-Chancellor depending on the nature of the review required. * Escalated reviews have specific legislated requirements that need to be approved by the University or are considered to be of a high risk and warrant the need for assessment review by subject matter experts. | |
|  | | |
| *Note: All safety assessment and review documentation is to be filed at local level and catalogued for auditing purposes.* | | |

**Table 1: guide for level of safety assessment and review**

|  |  |  |  |
| --- | --- | --- | --- |
| **Level of review** | **Hazard** | **Guidelines – hazards, risks or activities** | **Expedited Review** |
| **ESCALATED ASSESSMENT LEVEL** | **Biological** | * Genetically modified organisms (GMO) (includes GM Plants, animals, mammalian cells, microorganisms and cell lines) - Classification categories are: Exempt dealing, Notifiable Low Risk Dealing (NLRD's), Dealing not-involving intentional release (DNIR licence), Dealing involving intentional release (DIR licence) * Hazardous (risk group 2 and above) micro-organisms (bacteria, virus, fungi, yeast etc) or biological toxin * Non-laboratory animals which have a zoonoses risk (potentially infected/carrying risk group 2, 3 or 4 microorganisms) * Human body fluids, human cell lines or tissues not screened for pathogens, * Security sensitive biological agents * Any agent which poses a biological risk to the environment * nanoparticles or nanomaterials | **Biological which may receive expedited review:**   * Risk Group 1 micro-organisms that are not genetically modified, * laboratory animals (rats, mice, guinea pigs etc) that are not genetically modified, * non-laboratory animals with no risk of zoonoses, * non-infectious animal tissue.   *Note: Expedited reviews will not require assessment by the Institutional Biosafety Committee - but will be forwarded to the Committee for noting after confirmation from the Committee Chair that a review may be expedited.* |
| **Chemical** | * Security Sensitive Dangerous Goods, Explosives, or Fireworks * Require Health Monitoring as defined in Chapter 7, Division 6 & Schedule 14 of the WHS Regulation 2011 * S4 / S8 / S9 Poisons (including chemotherapy agents, anaesthetics, illicit drugs) as defined in Part 4 of the Poisons Standard 2013 * Prohibited or restricted carcinogens and restricted hazardous chemicals (as defined in Schedule 10 of the WHS Regulation 2011) * Dangerous Goods - Packing Group 1 (PG 1 - High Danger - refer to transportation section of Safety Data Sheet [SDS] for PG Classification) - Examples include: Ethidium Bromide or Hydrofluoric/Picric/Nitric Acid * Category 1 chemical diversion into illicit drug manufacture as defined in Appendix 1 of the Code of Practice for Supply Diversion into Illicit Drug Manufacture * Any other chemicals or hazardous reagents, which are not covered by the categories above, that should be reviewed for health and safety reasons, or in order to determine if a safer alternative is available or if the stock reagent can be purchased in a less concentrated form or in smaller amounts | **Chemical which may receive expedited review:**   * chemically hazardous materials listed adjacent which have been used in a previously approved activity or project, by the same Supervisor responsible for the proposed new activity or project.   *Note: Expedited reviews will not require assessment by the Chemical and Radiation Technical Committee (CRTC) - but will be forwarded to the Committee for noting after confirmation from the Committee Chair that a review may be expedited.* |
| **Radiation** | * Radioisotopes/unsealed sources * Ionising radiation/sealed sources * Non-ionising radiation (excluding Class 1 lasers) * Offsite radiation work | **Radiation which may receive expedited review:**   * Non-Ionising- Class 1 Lasers   *Note: Expedited reviews will not require assessment by the CRTC - but will be forwarded to the Committee for noting after confirmation from the Committee Chair that a review may be expedited)* |
| **High Risk International Travel** | * Travel to overseas locations rated DFAT Level 3 or 4 or ISOS security or medical rating of High requires PVC approval and Extreme that requires VC approval |  |
| **Offsite Activities** | * SCUBA diving, boating, abseiling, caving, canyoning, fieldwork / trips to remote locations * Interviews offsite with higher risk participants (participants who pose an identified risk to others), or where the nature of the research increases the risk | N/A |
| **Other** | * Cash and other monetary tender handling * Any other hazard or risk that requires assessment by a technical specialist or subject matter expert that is not available at a local level (e.g. engineering, mining, construction, or high voltage electrical activities). | N/A |
| **NON-ESCALATED REVIEW** |  | * Use of non-hazardous chemicals * Conducting interviews/surveys/assessments/focus groups in business premises or public locations in Australia or overseas locations rated DFAT Level 1 or 2 or ISOS rating of Low or Medium * Undertaking fieldtrips to non-remote locations, public locations/ businesses * Travel to low-risk overseas locations (DFAT Level 1 or 2 or ISOS rating of Low or Medium) * Manual handling risks, * General laboratory activities, workshop and practical activities (excluding chemical, biological, radiation hazards which fall under any of the categories for Escalated Review) * Events or functions which do not involve high risk activities * Activities involving physical exercise, * Interviews/surveys/assessments/focus groups which are not considered to be high risk or conducted in private premises (homes), * Any other hazard easily able to be locally assessed as a negligible risk, or low risk that can be effectively assessed by a technical specialist or subject matter expert that is available at a local level and where appropriate risk controls are readily available.   *Note: Where the activities above cannot be assessed and approved to proceed at the local level, then they will be escalated via the Health and Safety Team. If in doubt, then the Local Safety Contact should be contacted for advice.* | *Note: These reviews will not come to health and safety.* |

# Appendix D – Manual Handling Guidelines for Staff and Students

This summary outlines general and **IMPORTANT** points in any manual handling technique.

No manual handling activity is risk free and where practical such activities should be avoided or minimised. If it is necessary to proceed with the activity the following points should be considered. **It is highly important to conduct a risk assessment in the manual handling before any attempts are made to move an item that you are unsure of. For a risk assessment use the following link.**

1. ASSESS THE SITUATION

Assess the weight, shape and note any sharp edges. Is the load stable and the weight evenly distributed? Can you lift this load safely or is it a two-person lift? How far do you have to carry the load? Is your path clear? Can the load be broken into smaller pieces?

1. SIZE UP THE LOAD

Test the weight by lifting one corner before trying to move it. If you feel the load is too heavy ask for help.

1. USE GOOD LIFTING TECHNIQUES

**Stand close to the load** facing in the direction you intend to travel, with your feet spread to create a firm base.

**Bend your knees** and keep your back in a natural line. Don’t bend your knees fully as this may leave little power to lift.

**Grasp the load firmly.** The best grip is one in which the fingers are curled into a hook.

**Raise your head.**

**Lift with your legs -** Use your leverage, momentum, balance and timing for a smooth action. Move your feet as necessary.

**Avoid twisting** the body during lifting. Do not bend sideways.

**Hold the load close** to the centre of your body.

***ALWAYS LIFT WITH YOUR KNEES AND NOT YOUR BACK. Never bend over to reach an object.***

1. CARRYING A LOAD

**Keep the load close to your body**, with your arms and chin tucked in.

**Avoid twisting your body**, stooping, bending or leaning back. If you need to change direction move your feet.

**Don’t change your grip** unless the load is sufficiently supported

**Don’t block your vision** with the object you are carrying

**Rest if you feel fatigue.**

1. UNLOADING

**Bend the knees keep the back straight** to lower the object

**Keep the weight close to the body**

If the load is to be placed on a bench, **rest it on the edge and push it forward** with your arms and body

**Be careful of fingers and toe**

**Acknowledgement:** Thank you to the University of Wollongong.

# APPENDIX E – The Safe Removal of Contaminated Gloves

1. Pull one glove from near your wrist towards your fingertips until the glove folds over.

3. Pull the fold until the glove is almost off.

5. Slide your finger from your glove free hand under the remaining glove. Continue to slide your finger towards your fingertips until almost half of your finger is under the glove.

2. Carefully grab the fold and pull towards your fingertips. As you pull you are turning the inside of the glove outwards.



1. To avoid contamination, continue to hold the removed glove. Completely remove your hand from the glove.
   1. Turn you finger 180° and pull the glove outwards and towards your fingertips. As you do this, the first glove will be encased in the second glove. The inside of the second glove will also be turned outwards.
2. Grab the gloves firmly, by the uncontaminated surface (the side that was originally touching your hand). Release your grasp of the first glove you removed. Pull your second hand free from its glove. Dispose of the gloves into a bio-hazard bag

# A black and white drawing of a person's face Description automatically generatedAPPENDIX F – Hand Washing Technique

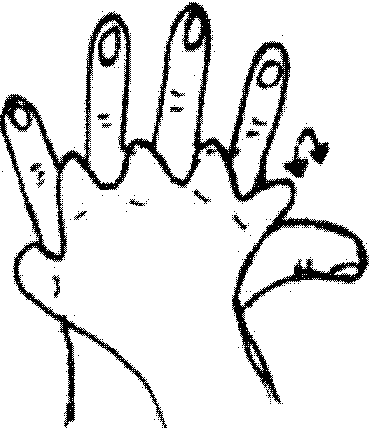
1. Move from the palms to the inside surfaces of the thumb changing from left to right hand

A black and white drawing of a person's face

Description automatically generated with medium confidenceA black and white outline of a person's face

Description automatically generated with medium confidence3. Move over to the backs of the hands and then to the wrists giving a few twists around **the wrist.**

1. Intertwine the fingers of both hands again to cover the webs of the fingers.

2. Intertwine fingers of both hands and work them back and forth to fuII length of fingers on each side.

4. From the wrist, move the hand on top over the backs of the fingers, including the thumb on the hand below.

1. Diagram

   Description automatically generatedRub the nails and fingertips back and forth over the palm of the opposite hand.