

# Health, Safety and Environment Management System

## HSE-PRO-013 Laboratory Safety Procedure

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# 1 Intent

The intent of James Cook University (JCU) Laboratory Safety Procedure is to manage laboratory risks, while ensuring the health and safety of personnel and the environment, and the fulfilment of regulatory obligations.

This procedure provides guidelines for all aspects of laboratory conduct. Safe Laboratory practice must comply with statutory obligations and relevant Australian / New Zealand Standards (AS/NZS 2243: Safety in Laboratories Series).

These spaces may also have activities conducted that trigger additional procedural requirements. Such as laboratories that:

- Work with pathogens or biological sources
- Contain radiation apparatus or isotopes
- Contain hazardous chemicals
- Contain animals
- Are operated under regulatory certifications such as from the Office of the Gene Technology Regulator, or Approved Arrangements for quarantine purposes.

This Procedure has been written in the context that:

- JCU Estate Directorate maintains the fabric of laboratory spaces.
- Operational management of laboratories is governed by the Divisions and Institutes.
- JCU has procedures in place for:
  - Biosafety
  - Hazardous Chemicals
  - Asbestos
  - Drugs and Poisons.

# 2 Scope

The requirements of this procedure are mandatory for a general space being identified as a laboratory and should be applied where other locations that are not a laboratory have equipment or processes mentioned within this procedure (example, gas cylinders).

This Procedure applies to all JCU employees, adjuncts, students, visitors, volunteers and contractors conducting activities associated with laboratories for the purpose of:

- Research
- Teaching
- Study
- Maintenance or Construction
- Cleaning.

This Procedure does not apply to JCU Controlled Entities. The controlled entities must ensure appropriate procedures and controls are in place for laboratory safety under their control.

### 3 Definitions

Term	Definition
Laboratory	Space identified by JCU Estate Directorate and the relevant Division as a Laboratory.  This could include any part of a building that is used for scientific or technical work that may involve chemicals, pathogens, radiation, mechanical or other processes.
Laboratory Supervisor	Person nominated as in control of the laboratory by the Division, or College management. This will be a member of staff.
Worker	A person who carries out work in any capacity for JCU, and includes working as: <ul style="list-style-type: none"><li>• an employee</li><li>• a volunteer</li><li>• an apprentice or trainee</li><li>• a student gaining work experience (paid or unpaid)</li><li>• a contractor or subcontractor and their employees</li><li>• labour hire company employees assigned to work for JCU.</li></ul>
Working in Isolation	Work carried out in an area where normal means of contact (e.g. verbal, sight) with other staff is not available, so that the potential risk of existing hazards is increased to the extent that extra precautions are needed.  This includes working in isolated areas on or off-site, either during or outside normal working hours.

### 4 Duty, Obligations and Responsibilities

#### 4.1 James Cook University

JCU is responsible for:

- Maintaining laboratories to the minimum standard that is outlined in the relevant Australian Standards
- Inspecting and maintaining equipment within the laboratories
- Disposing of laboratory waste streams appropriately
- Ensuring funding for compliance is available.

#### 4.2 College Managers / Directors / Managers / Operation Managers of Divisions

JCU management is responsible for ensuring that the requirements of this procedure are being met within the area of their control, including:

- An induction process is in place for laboratories
- Risk assessments are in place for laboratories and the activities are conducted
- Laboratories are identified on the Estate Directorate Space Management system
- That safe and appropriate equipment is supplied and maintained within laboratories.

### 4.3 Estate Directorate

- Categories in the JCU Space Management system, spaces that are identified as laboratories
- Maintain the fabric of laboratories
- Oversee the electrical testing and tagging of equipment in laboratories
- Coordinate annual inspections of emergency showers and eyewashes
- Coordinate annual inspections of fume cabinets
- Coordinate inspection and maintenance of gas monitoring and alarm systems
- Coordinate electrical testing and tagging.

### 4.4 Workers

Workers must take reasonable care for their own health and safety when undertaking JCU activities. In relation to laboratory safety, this means:

- Complying with this Laboratory Safety Procedure
- Not accessing any laboratory, unless appropriately inducted
- Complying with all laboratory rules and reasonable direction from Laboratory Supervisors, including risk assessments and safe operating procedures
- Reporting any medical conditions or allergies that may place the person at increased risk
- Wearing enclosed footwear and any mandatory personal protective equipment (PPE) for the laboratory or activity being undertaken
- Reporting all hazards, incidents and defective equipment to the Laboratory Supervisor immediately
- Label all substances in accordance with *Schedule 9 of the Work Health and Safety Regulation 2011 (Qld)*.

### 4.5 Research Students

- Ensure compliance with this procedure
- Comply with the requirements of “Workers” under this procedure
- Not to access any laboratory, unless appropriately inducted.

### 4.6 Laboratory Supervisors

Laboratory Supervisors are required to ensure the requirements outlined in this Procedure are being met, by ensuring:

- Laboratories under their control have a risk assessment in place for the activities conducted within that laboratory
- Regular inspections are conducted of the laboratory space, plant and equipment
- Plant and equipment is maintained in a safe condition for use
- Waste streams are disposed of correctly as per section 11 of this procedure
- All laboratory users have a current specific laboratory induction and all induction records are retained
- Emergency equipment (such as first aid kits, fire extinguishers) is available and evacuation plans are known to all laboratory users
- Laboratory signage is correct and current

- Safe Operating Procedures are in place for plant and equipment and are regularly reviewed for accuracy
- Good housekeeping is maintained
- Ensure the laboratory safety manual is up to date and appropriate for the laboratory
- Mandatory PPE is made available to laboratory users and is maintained
- Hazards and incidents are recorded in JCU's hazard and incident register (Riskware)
- Maintaining requirements as per associated JCU procedures, not limited to:
  - Correct purchasing and storage of scheduled drugs and poisons
  - Maintaining an up to date chemical manifest on the ChemWatch system.

#### **4.7 Health, Safety and Environment (HSE) Unit**

The JCU HSE Unit acts in an advisory role in relation to the way laboratories are managed at JCU. The HSE unit will schedule and conduct annual audits in collaboration with the Laboratory Supervisor and / or the nominated Laboratory Technician.

#### **4.8 Academic Supervisors**

Academic supervisors are required to maintain the safety of their staff and students by ensuring:

- The requirements of this procedure are being met
- Projects have a risk assessment in place for the activities conducted
- Waste is disposed of correctly as per section 11 of this procedure
- Inductions are carried out for laboratory users
- Emergency equipment is available and evacuation plans are known
- Laboratory signage is correct and current
- Safe operating procedures are in place for plant and equipment
- Good housekeeping is maintained
- The relevant approvals are obtained for:
  - Scheduled drugs and poisons
  - Radiation apparatus and isotopes
  - Carcinogens
  - Biosafety relevant activities
  - Quarantine materials.

#### **4.9 Contractors**

If contractors are required to perform activities within laboratories at JCU, the contractor must:

- Be inducted into each laboratory in advance of works
- Not enter a facility unless authorised by the laboratory supervisor
- Follow all instructions provided for the entry of each laboratory including the use of personal protective equipment.

### **5 Access and Authorisation**

Laboratories are to be secured to restrict access to authorised and inducted personnel only. This includes contractors and cleaning staff.

Access and authorisation requirements are to be proportionate to the risks associated with processes carried out and the materials and equipment stored within the laboratory.

## 6 Training and Induction

All laboratory users are required to be inducted into the laboratories being used.

Inductions must be developed for each laboratory. Laboratory/Division, building-specific information is determined by considering the activities carried out, the equipment and materials used and stored in that particular laboratory.

Refresher inductions must be undertaken at least every two years. However inductions may need to be refreshed in the following circumstances:

- legislative change and / or changes to the JCU HSMS requirements
- hazards in the area change due to new equipment, materials or activities
- following an incident.

Induction records must include the name and signature of the inductee, inductor and the date the induction was undertaken. The induction record must be retained in accordance with JCU Records Management Policy.

### 6.1 Safe Operating Procedures

Laboratory and Academic Supervisors are to ensure Safe Operating Procedures (SOP) are to be developed for tasks and the use of equipment where there could be a risk to health and safety.

Staff and students should receive training in the safe operating procedure and a record of the training is to be retained.

The approved JCU SOP template should be used.

Related Information:	Standard Operating Procedure (SOP) Template Safe Work Method Statement (SWMS) Template
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## 7 General Laboratory Safety Requirements

### 7.1 General Rules

The following rules apply as a minimum to all laboratories:

- Unauthorised entry to the laboratory is strictly forbidden
- No food or drink for human consumption is to enter, or to be consumed within a laboratory
- Staff and all students (undergraduate, honours and postgraduates) must obtain permission to access the laboratory out of hours as per section 9 of this procedure
- Laboratory waste must be disposed of correctly and not flushed to sewage as per section 11 of this procedure
- Enclosed footwear must be worn
- Personal protective equipment is to be worn as specified
- Safety glasses to be worn when handling hazardous substances
- Long / mid length hair and scarves shall be tied back



- Loose clothing secured and jewellery removed when using equipment with moving parts
- Children are not permitted in laboratories
- When leaving microbiological laboratories remove laboratory coats and wash hands
- Mouth pipetting is prohibited
- Experiments which will be left running overnight must have an “unattended experiment card” filled in specifying contact details of researcher, hazards and steps to be taken in an emergency. The experiment must be appropriately secured/isolated for the time period
- Do not use any machines, equipment or laboratory apparatus without prior instruction / training by the supervisor or technical staff on Safe Operating Procedures and practices. Whilst using any equipment the relevant SOP shall be adhered to
- Unless required, windows both internally and externally to the building are not to be covered.

## 7.2 Laboratory Safety Manual

All JCU laboratories are required to have an up-to-date laboratory safety manual in place. The manual can cover multiple facilities.

The laboratory safety manual must cover the following topics:

- SOPs for the equipment and processes undertaken at the laboratory
- Rules for each laboratory contained in the manual for the particular laboratory
- Waste disposal rules for the types of wastes generated in the particular laboratory
- Decontamination procedures required for the laboratory or equipment.

## 7.3 Hygiene and Housekeeping

Good hygiene and housekeeping practices are to be incorporated into the management of all JCU laboratories.

The following housekeeping tasks must be completed by lab users as a minimum:

- Floors, aisles and exits are to be kept tidy, free of obstruction and dry
- Benches are to be kept clean
- The work area is to be cleaned thoroughly after experiments are completed
- Access to all emergency / safety equipment (fire extinguishers, first aid kits, chemical spill kits, emergency shower and eye washes) are to be kept free from obstruction
- Work areas including the interior of fume cupboards and equipment are to be thoroughly cleaned after use
- When leaving the laboratory, make sure gas supplies and equipment is turned off and flames are extinguished
- Regularly empty laboratory waste bins (biohazard waste, glass bins and chemical waste). Notify Estate Directorate if cleaner’s bins require emptying
- Rinse glass and plastic ware after use and remove labels if the item is being disposed of
- At the end of the day return chemical containers to the appropriate storage locations.

Cleaning staff are required to mop and vacuum floors, and empty general waste bins. Laboratory staff are responsible for all other cleaning duties.

Refrigerators, cool rooms, freezers, ovens and microwave ovens in laboratories must be labelled to prohibit their use for food or drink for personal consumption. Where the laboratory entry door has this requirement displayed the signage is not specifically required within the laboratory.

## **7.4 Personal Protective Equipment**

The clothing and personal protective equipment (PPE) that is required is dependent on the type of laboratory, the activities carried out and the materials and equipment stored within the laboratory. As a minimum, the following protective clothing must be worn in every JCU controlled laboratory:

- Enclosed footwear must meet the following requirements:
  - No open toes
  - Back of the heel to be covered
  - Upper surface must be enclosed
  - Equivalent coverage and protection as provided by a running/jogging shoe
- Laboratory coat or back fastening laboratory gowns (Cotton is recommended)
- Safety glasses are to be worn when handling hazardous substances.

A risk assessment must be undertaken to assess hazards associated with the activities, equipment and substances used within the laboratory to determine any additional PPE that is mandated.

Mandatory PPE and clothing requirements must be clearly displayed at the entrance of the laboratory. These requirements must also be stipulated in the laboratory induction. The laboratory supervisor is to ensure that staff are trained in the use of Personal Protective Equipment.

Mandatory PPE must be readily available upon entry to the laboratory.

All PPE must be appropriately rated for the intended hazard and be appropriately stored and maintained by the user to ensure it remains effective to control the identified hazard(s).

## **7.5 WHS Risk Management**

Each laboratory is to have a risk management plan in the form of a risk assessment stored in the RiskWare system. The following items are to be considered as applicable in the risk assessment:

- Tasks conducted in the laboratory
- Substances used within the laboratory
- Skill set of person/s performing the task (example undergraduate, researcher)
- Biological hazards
- Radiation apparatus or sources
- Scheduled drugs and poisons within the laboratory
- Cytotoxic drugs
- Manual handling
- Electrical hazards
- Lasers
- Animals

- Laboratory plant and equipment
- Quarantine
- Genetically Modified Organisms
- Gas cylinders

The risk management plan must be communicated in the laboratory induction and laboratory safety manual.

## 7.6 Research Project Risk Assessment

Each research project is required to have the associated risk from the procedures assessed and treated in accordance with HSE-PRO-011 Work Health and Safety Risk Management Procedure.

All risks assessments must be recorded in JCU's risk register, RiskWare.

## 7.7 Inspections

Laboratory inspections are to be conducted periodically according to risk by the laboratory supervisor (or delegate) of the laboratory.

### 7.7.1 Inspection Items

Laboratory inspections should include:

- Storage of substances:
  - Segregation
  - Chem Watch Inventory
  - Labelling
  - Safety Data Sheets (SDS) are current
- Plant and equipment
- Fire extinguishers are within test date and not obstructed
- Safety showers and eyewashes are inspected weekly unless a risk assessment determines otherwise, this could include testing the shower before commencing activities in the specific area
- Fume cupboards have had annual inspection
- Biosafety cabinets have had annual inspection
- Autoclaves have had annual inspection
- Training records are up to date
- Laboratory signage is correct and current
- Waste is disposed of correctly as per section 11 of this procedure
- Pest control (as required)
- Security
- Walls, ceiling, windows and doors are in good condition.

Records of the inspections are to be retained by the Laboratory Supervisor.

## 7.8 HSE Unit Audits

The JCU HSE Unit also conducts annual audits of all laboratories. The findings from the audits are kept in the RiskWare system. The Riskware system is used to assign actions and due dates.

## 7.9 Entry Signage

Laboratories are to have entry signage displayed on the door. The signage will need to list:

- Laboratory contact person
- Personal protective equipment required
- Emergency contact information
- Summary of hazards present within the laboratory.

Related Information:	Lab signage template
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## 7.10 Decontamination Certificate

Equipment and items within a laboratory will require decontamination before being removed from the laboratory or maintenance is carried out.

The JCU decontamination certificate is to be attached to the equipment or item once decontamination has been carried out by service personnel.

Related Information:	Decontamination Certificate
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# 8 Hazard Specific Safety Requirements

## 8.1 Ventilation

The capacity of the laboratory ventilation shall be appropriate to the current laboratory operations. The ventilation requirements provided in AS 1940 should be taken into account. Where unsafe concentrations of airborne contaminants are generated or there is a risk of oxygen depletion in a laboratory, adequate ventilation or fume extraction facilities shall be available to ensure their efficient removal or treatment. Appropriate fail-safe or alarm mechanisms shall be provided.

## 8.2 Fume Cupboards

Where fume cupboards are provided, their installation, operation and maintenance shall comply with AS/NZS 2243.8.

- Excess materials should not remain in fume cupboards
- Fume cupboards shall not be used as storage facilities for hazardous materials
- When an experiment is completed, the equipment is to be cleaned and the cupboard left clear for the next experiment
- Large volumes of substances are not to be placed into the fume cupboard with the intent of allowing the substance to evaporate
- Fume cupboards are to be inspected at least annually in accordance with the requirements of AS/NZS 2243.8. The annual inspection regime is coordinated by the Estate Directorate.

### **8.3 Other types of Local Exhaust Ventilation**

There are no specific Australian or New Zealand Standards for the design of other types of local exhaust ventilation such as slot ventilation, flexible ducts or overhead hoods. However, guidance material is available from the American Conference of Governmental Industrial Hygienists and the British Occupational Hygiene Society.

## **9 After Hours Work / Working Alone**

Any work in laboratories that is to be conducted outside of normal working hours that is considered to pose a risk to health and safety, will require a risk assessment and approval from the Laboratory Supervisor or Academic Supervisor. There must be suitable control measures in place to reduce the risk to an acceptable level.

Out of normal hours are times outside of the normal business hours, and public or University holidays that occur during normal business hours (refer to the Enterprise Agreement).

Working within offices conducting administrative duties, are exempt from these requirements.

Divisions and/or Colleges must determine where these requirements are applicable. This may be achieved in local documents such as the laboratory safety manual.

When required the risk assessment must be recorded in RiskWare and as a minimum should make an assessment of the following:

- Security including:
  - ability to limit access to the building / location
  - travel to the laboratory and home, including the use of campus security for escort when deemed appropriate
- Communication being available including positive communication to check on welfare and when the person has departed
- Substances that will be used
- Plant and equipment
- Emergency procedures
  - Spill kits
  - First aid kit locations
  - Contact for campus security
- Medical conditions.

### **9.1 Tasks Too Dangerous for Work Alone**

There are activities that are considered to be too risky to be conducted by a person alone. These include:

- Working in locations where there is no available means of communication
- Work that is remote or isolated from the assistance of others
- Work risk assessed as too hazardous to work alone
- Working with large or aggressive animals

- Where there is a diagnosed medical condition that requires the person to be monitored.

## 10 Design and Construction

Laboratories will be designed and constructed in line with the requirements of AS/NZS 2982 laboratory safety series.

## 11 Laboratory Waste

Laboratory practices produce a variety of waste types.

Laboratory waste must be managed using the following general rules:

- Laboratory wastes must be kept segregated from incompatible substances
- Waste must not be disposed of down the sink unless authorised under the trade waste limits set by the local council
- Large volumes of waste should not be accumulated
- Waste should not be mixed
- Contact the University Store for assistance in arranging chemical waste disposal
- Wastes are to be labelled, transported and disposed of in a manner that is appropriate for the class of waste outlined in Table 1 below.

**Table 1: Waste Class and Disposal Route**

<b>Waste Class:</b>	<b>Consideration:</b>	<b>Waste Path:</b>
<b>Paper and Plastic</b>	A bin is to be provided for general paper and plastic.	General disposal.
<b>Sharps</b>	A yellow sharps container compliant with Australian Standard 4031-1992, Non-reusable containers for the collection of sharp medical items used in health care areas.  Do not attempt to remove from container.	Autoclaved and disposed of in the industrial waste bins.
<b>Pipettes</b>	Pipettes can cause rubbish bags to tear. As such pipettes are to be placed into a container with hard sides before being placed into rubbish.	If used for biological hazards autoclave before disposal in the industrial waste bins.
<b>Broken Glassware</b>	A suitable container/bin is to be labelled "broken glass"  Broken glassware is to be clean or free of hazardous wastes before being placed in the bin.	Dispose of into industrial waste bins.
<b>Cytotoxic Waste</b>	Cytotoxic waste disposed of into a purple container labelled "Cytotoxic Waste".	Dispose of through regulated waste removal company.

<b>Waste Class:</b>	<b>Consideration:</b>	<b>Waste Path:</b>
	Cytotoxic waste can also include soiled bedding from animal housing.	
<b>Pharmaceuticals (Scheduled Drugs and Poisons)</b>	<p>A pharmaceutical waste bin can be obtained from a regulated waste company.</p> <p>Cytotoxic bins can be used for pharmaceutical disposal.</p> <p>Schedules 4, 7, 8 and 9 will require an update in the controlled drug register to record the disposal.</p>	<p>Pharmaceutical waste (Drugs and Poisons) are to be disposed of in accordance with HSE-PRO-004 Drugs and Poisons Procedure.</p> <p>Dispose of through regulated waste removal company.</p> <p>Schedule 8 controlled drugs can be disposed of by Queensland Health (see HSE-PRO-004 Drugs and Poisons Procedure).</p> <p>Empty containers can be cleaned and have the label removed.</p>
<b>Radioactive Waste</b>	Radioactive waste is to be stored and marked as per HSE-PRO-003 Ionising Radiation Procedure.	Disposal of waste in line with HSE-PRO-003 Ionising Radiation Procedure.
<b>Biological Waste (clinical waste)</b>	<p>Biological wastes. Placed into bags marked "biohazardous waste".</p> <p>This can includes animal carcasses and items contaminated with infectious materials such as gloves.</p>	Biohazardous waste is to be autoclaved and disposed of by a regulated waste company as required by HSE-PRO-009.
<b>Hazardous Chemical Waste</b>	<p>Consult the Safety Data Sheet (SDS) for the substance to determine how the substance is to be disposed of.</p> <p>Label hazardous waste containers with the content. The minimum information (AS2243.2:2006) is:</p> <ul style="list-style-type: none"> <li>• Signal words and the dangerous goods class and subsidiary risk labels where applicable.</li> <li>• Substance name or correct shipping name for single component waste.</li> <li>• United Nations (UN) number, or chemical abstract service (CAS) number where applicable.</li> <li>• Where possible for compatible mixed component waste, list the major ingredients and formulation.</li> <li>• Where necessary, provide warnings if special procedures</li> </ul>	<p>Dispose of as per SDS.</p> <p>Where required dispose of through a regulated waste company.</p>

Waste Class:	Consideration:	Waste Path:
	<p>are required to control emergency situations or to prevent life threatening human exposures.</p> <p>Where mixed waste products are packaged together, the above information should be based on the major component or the component which constitutes the main risk.</p>	
<b>Antibiotics</b>	<p>Antibiotics cannot be disposed of into sewage or landfill unless deactivated or below a level of detection specified by the local council</p> <p>The majority of antibiotics are schedule 4, and will require an update in the controlled drug register to record the disposal.</p> <p>Antibiotics that can be deactivated by heat or another process can be disposed of in the industrial waste after the process is applied, provided there are no secondary hazards (such as hazardous chemicals).</p>	<p>Can be disposed of in cytotoxic bins.</p> <p>Can be disposed of through a regulated waste company.</p> <p>Dispose of through a regulated waste disposal company where the antibiotic cannot be deactivated (Table 2).</p>
<b>Specimens/Samples</b>	<p>The disposal of specimens/samples needs to take into account the nature of the item (example biological, mineral or potential contamination) and any preservation technique that was used (e.g. formalin).</p> <p>These items may require disposal through a regulated waste company.</p>	

## 11.1 Antibiotic Deactivation

A summary of antibiotics that can be deactivated by heat treatment are provided below in Table 2.

If an antibiotic cannot be deactivated, dispose of the material as a regulated waste.

**Table 2: Antibiotic Deactivation**

Antibiotic	Group/Family	Mode of inactivation	Waste Disposal Recommendation
Ampicillin	Beta-lactam	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Carbenicillin	Beta-lactam	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Penicillin	Beta-lactam	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Geneticin (G418)	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer



Antibiotic	Group/Family	Mode of inactivation	Waste Disposal Recommendation
Gentamycin	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Hygromycin B	Aminoglycoside	Unknown	Regulated waste disposal
Kanamycin	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Neomycin	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Puromycin	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Streptomycin	Aminoglycoside	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Chloramphenicol	Bacteriostatic	Not destroyed by autoclaving	Regulated waste disposal
Tetracyclin	Bacteriostatic	Unknown	Autoclave/ boil and dispose to sewer
Vancomycin	Bacteriostatic	Autoclaving/Boiling	Regulated waste disposal
Amphotericin	Broad-range fungicide	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Blasticidin	Nucleoside	Unknown	Regulated waste disposal
Ciprofloxacin	Quinolone	Not destroyed by autoclaving	Regulated waste disposal
Enrofloxacin	Fluoroquinolone	Not destroyed by autoclaving	Regulated waste disposal
Erythromycin	Macrolide	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Nalidixic acid	Quinolone	Unknown	Regulated waste disposal
Sulfadoxin	Sulfonamide	Autoclaving/Boiling	Autoclave/ boil and dispose to sewer
Zeocin	Glycopeptide	Unknown	Regulated waste disposal
Zeomycin	Glycopeptide	Unknown	Regulated waste disposal

## 11.2 Disposal to Sewage

Waste cannot be disposed of into the sewage system unless it is in compliance with the trade waste admission limits for trade waste set by the local council. The trade waste limits can be found on the local council websites. A current trade waste approval must be in place with the local council.

Where an admission limit is silent the substance must not be disposed of in detectable levels of the concentration.

The council also lists prohibited waste, such as a substance with pH lower than 6.0 or greater than 10.0.

Related Information:	<p>Trade waste limits: Townsville <a href="https://www.townsville.qld.gov.au/_data/assets/pdf_file/0013/11083/TRADE-WASTE-SEWER-ADMISSION-LIMITS-FACTSHEET.pdf">https://www.townsville.qld.gov.au/_data/assets/pdf_file/0013/11083/TRADE-WASTE-SEWER-ADMISSION-LIMITS-FACTSHEET.pdf</a></p> <p>Cairns <a href="http://www.cairns.qld.gov.au/_data/assets/pdf_file/0003/42699/Trade_Waste_Dischargers_Guidelines.pdf">http://www.cairns.qld.gov.au/_data/assets/pdf_file/0003/42699/Trade_Waste_Dischargers_Guidelines.pdf</a></p> <p>Mackay <a href="http://www.mackay.qld.gov.au/_data/assets/pdf_file/0003/199047/Trade_Waste_Management_Plan_-_Approved_300416.pdf">http://www.mackay.qld.gov.au/_data/assets/pdf_file/0003/199047/Trade_Waste_Management_Plan_-_Approved_300416.pdf</a></p>
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## 12 Fire and Other Emergencies

Fire protection equipment and fire detection equipment shall be installed in a laboratory where there is a foreseeable risk of fire or explosion.

Fire extinguishers and fire hose reels shall be selected based on the requirements of the laboratory.

Where the uses of substances that can pose a fire or explosion risk are used, hazardous areas should be classified in accordance with AS/NZS 2430.3.6 Classification of hazardous areas.

### 12.1 Chemical Spills

When an uncontrolled chemical spill occurs, the following process must be followed:

- Identify the chemical type and refer to the safety data sheet (SDS) for personal protective measures and for specific clean-up method
- Access the spill kit and don the required PPE / respiratory protection if required
- Contain the chemical spill.

Spill kits are to be:

- Appropriate for the substances within the laboratory
- Inspected and maintained as part of laboratory inspections.

Staff and research students are to be trained in the use of the spill kits.

Contaminated material must be placed in sealed containers, labelled and disposed of as contaminated waste in accordance with section 11 of this procedure.

## 13 Safety Equipment

Laboratories are to have appropriate safety equipment available as identified in the laboratory risk assessment.

### 13.1 Safety Showers and Eyewash Equipment

Plumbed safety showers and eye wash equipment must be tested and maintained in accordance with ANSI Z358.1.

Regular operational checks are to be conducted by the laboratory technician/staff. This testing should be recorded.

Annual maintenance inspections are to be conducted by a competent person. This testing is to be organised and records of testing retained by the Estate Directorate.

The Division is to supply a list of safety showers to the Estate Directorate to allow annual inspections.

### **13.2 Self-Contained Breathing Apparatus**

Where self-contained breathing apparatus (SCBA) has been assessed as necessary, the following must be in place:

- Training in the use of the SCBA for staff
- Secure storage for SCBA
- A maintenance and inspection regime.

## **14 Electrical**

A Residual Current Device (RCD) is to be fitted to the circuits of all laboratories.

If electrical equipment is located in a laboratory which could be considered a 'hostile environment' the equipment will need to be included in the electrical test and tag program.

A hostile environment is a location in which the equipment or appliance is normally subject to events or operating conditions likely to result in damage to the equipment or a reduction in its expected lifespan.

This includes, but is not limited to mechanical damage, exposure to moisture, heat, vibration, corrosive chemicals and dust.

## **15 Hazardous Substances**

Hazardous substances that are stored or used in a laboratory must be managed according to the class of the substance. In addition to this Laboratory Safety Procedure, the following Procedures outline how specific hazardous substances are to be managed:

- HSE-PRO-003 Ionising Radiation Procedure
- HSE-PRO-004 Drugs and Poisons Procedure
- HSE-PRO-005 Hazardous Chemicals Procedure
- HSE-PRO-009 Biosafety Procedure.

### **15.1 General Use**

- An inventory of hazardous chemicals must be maintained:
  - The preferred method is to enter the inventory into the Chem Watch system
  - The inventory must include the maximum storage amount for each item
- Safety data sheets must be available
- All substances must be labelled in accordance with *Schedule 9 of the Work Health and Safety Regulation 2011 (Qld)*

- A risk assessment is to be completed for the use of all hazardous substances. The assessment will need to include the various ways the substance will be used
- Keep the minimum quantity required
- Treat containers as if full, unless cleaned and label removed
  - Exception being labelled laboratory glassware or similar items that are identified as clean and are awaiting reuse
- Spill trays should be used for containers. The spill tray will need to be able to hold 110% of the largest container
- Use substances within fume cupboards to reduce the potential for exposure
- Substances should not be left open within the laboratory or storage areas.

## 15.2 Storage Other Than in a Chemical Storage Cabinet

Chemicals that are kept on shelves or racks shall be subject to the following restrictions:

- Substances should not be stored higher than 1.5m from the floor shelves over benches
- Shelving and fixtures shall be compatible with the goods stored, or be protected from the goods
- The shelving system capacity is not to be exceeded
- Shelves must be restrained from lateral movement
- Liquids should be stored on the lower shelves.

The quantities of hazardous chemicals other than those in a chemical storage cabinet shall not exceed those specified in Table 3 below. The quantities are an accumulation of the type of substance not a limit per item.

**Table 3: AS/NZS 2243.10:2004 Storage Other Than in a Chemical Storage Cabinet**

Type of substance or Class of dangerous goods	Maximum per 50 m <sup>2</sup> kg or L	Maximum pack size kg or L	Conditions for storage	Alternative storage options
Class 3 primary or subrisk	10	5	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	AS 1940 or AS/NZS 3833
Combustible liquids	50	20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	AS 1940 or AS/NZS 3833
Classes 4.1, 4.2, 4.3, 5.1 or 5.2 (see Note 1)	20 but less than 10 of any one Class	10	Labelled standard laboratory cupboard or, for Classes 4.1, 4.3 and 5.1, in small amounts throughout the laboratory	AS 2714 or AS/NZS 3833

Class 6.1	PG I 10 (Note 2) Other 50	PG I 10 (Note 2) Other 20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	AS/NZS 4452 or AS/NZS 3833
Class 8	20 for liquids 50 for solids	20	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	AS 3780 or AS/NZS 3833
Class 9 and aerosols	50 for liquids 100 for solids	5 for liquids 20 for solids	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	AS/NZS 4681 or AS/NZS 3833
Maximum aggregate quantity	200			
Hazardous substances		5 for liquids 20 for solids	Labelled standard laboratory cupboard or in small amounts throughout the laboratory	

(Note 1) The quantities for Class 5.1 stated in the Table are the total amount of active ingredient present, rather than the actual volume or mass to allow for the very wide differences between concentrations of active ingredient in peroxides and hypochlorites that are commonly used in laboratories.

### 15.3 Chemical Storage Cabinets

- The capacity of any chemical storage cabinet used in a laboratory to store chemicals of Classes 4.1, 4.2, 4.3, 5.1 or 5.2 shall not exceed 50 L. For other chemicals, the capacity shall not exceed 250 L.
- Cannot be located where they can jeopardize emergency escape (eg under a stair case) or 3m from an exit door.
- Not closer than 3m to ignition sources other than ceiling lights
- Must have the bottom shelf installed.
- Cannot have substances stored in the bund
- Must be correctly labelled for the class of substance.

### 15.4 Gas Cylinders and Supplies

The installation of compressed gas cylinders and gas supply lines for use in laboratories must consider the following:

- Should be stored outside of the laboratory
- Should be mounted outside of the laboratory
- Any gas cylinder shall not exceed 70 L (G size cylinders are 50L internal)
- Gas supply lines should have flow restrictions installed.

The use of gas cylinders must have a risk assessment performed by the laboratory supervisor or person proposing to use the gas cylinders. The following risks must be considered depending on the content of the gas cylinder and intended location of the cylinder. Including but not limited to:

- Potential for asphyxiation

- Potential for toxic effects
- Potential for fire
- Potential for increased oxygen
- Mounting to avoid physical damage
- Controls for safe relocation of gas cylinders to avoid harm caused by manual handling or release of contents.

The assessment must address the calculation of the potential hazard if the full volume of the gas cylinder was released, including:

- Lowering of the oxygen level
- Potential airborne concentration compared to the exposure standard, where applicable
- Fire and explosion.
- Calculation of the worst case regulator failure. This can be obtained from the supplier, and will be the maximum release (flowrate) possible from the regulator on failure. The assessment must include:
  - Lowering of the oxygen level
  - Potential airborne concentration compared to the exposure standard, where applicable
  - Fire and explosion.
- Calculation of the expected environment under the intended conditions of use. This would be the intended rate of release taking into account air turn over in the room. The assessment must include:
  - Lowering of the oxygen level
  - Potential airborne concentration compared to the exposure standard, where applicable
  - Fire and explosion.

## 15.5 Cryogenic Liquids

The use of cryogenic liquids must comply with the following:

- The container must be labelled in accordance with AS 1894-1997 the storage and handling of non-flammable cryogenic and refrigerated liquids
- The capacity of a container shall not exceed 250L
- The cryogenic liquids shall not be stored within unventilated rooms such as cold rooms
- People are not to travel with cryogenic containers within a lift. The cryogenic container can be placed in the lift by itself
- A risk assessment must be conducted by:
  - The laboratory supervisor for existing installations; or
  - Person proposing to use the gas cylinders; or
  - As part of the design of any new gas installation (including in new buildings)
- The assessment will need to include Calculations to determine:
  - Potential for oxygen depletion and asphyxiation.
  - Need for any oxygen monitoring or fail safe mechanisms and other controls.

- Transport (example external to vehicle cabins).

Where flammable or toxic cryogenic liquids are required in a laboratory, the additional requirements apply:

- The capacity of the container shall not exceed 5L
- The container shall be kept in a specially ventilated extraction enclosure exhausting to atmosphere
- Cryogenic liquids that are flammable or toxic shall not be stored in a laboratory
- The risk assessment must also include assessment of:
  - Exposure to the relevant exposure standard.
  - Fire and explosion.

## **15.6 Atmospheric Contamination Systems**

Where it has been deemed that atmospheric gas alarms are required, the systems must be maintained. The detection system must be appropriate in installation and function for the type of atmospheric hazard, including:

- Mounting of sensors appropriate to the properties of the hazard, such as at lower levels for gases heavier than air
- Detection of either a condition or the particular contaminant as required. Example:
  - CO<sub>2</sub> sensors for CO<sub>2</sub>, rather than oxygen sensors. As the occupational exposure standard for CO<sub>2</sub> can be exceeded before the oxygen level has changed markedly
  - Oxygen sensors for large quantities of nitrogen.
- The detection systems must have procedures in place for:
  - The response to an alarm
  - Emergency contacts
- The Estate Directorate must be in control of the installation of the system
- The system will require regulator, inspection, calibration and maintenance
  - Records must be retained by the Estate Directorate
- Signage clearly stating the hazard must be installed on each entry to the laboratory.

## **15.7 Refrigeration**

- A refrigerator may be used to store flammable chemicals provided it has been designed and manufactured to eliminate ignition sources
- Refrigerators unsuitable for solvent/flammable storage should be marked “not suitable for flammable solvents
- Refrigerators should be marked as “no food or drinks”, except where all entries are signed that no food or drink is allowed in the space.

### **15.7.1 Cool Rooms**

Cool rooms are not intrinsically safe and advice should be sought prior to the storage of flammable solvents in walk in cool rooms or freezers.

Cryogenic liquids must not be stored inside of cool rooms.

## **16 Plant and Equipment**

## 16.1 General

The use of plant and equipment must be addressed in the laboratory risk assessment.

Where the use of a piece of plant or equipment is considered to have an inherent level of risk, a Safe Operating Procedure (see section 6.1 of this procedure) and risk assessment must also be developed.

Plant must have appropriate guarding to prevent injury.

## 16.2 Operation of Instruments

The table below lists guidance material for the safe operation of laboratory instruments which may be used in consultation for the development of Safe Operating procedures and training.

Guidance Material	Activity / Equipment
AS 2243.7	Electrophoresis equipment
AS 2939	Robotic equipment
AS 2243.4, NOHSC:3022, NHMRC RHS No. 9 and NZ National Radiation Laboratory NRL C2	X-ray analysis equipment
ASTM E168	For infra-red spectrophotometry
ASTM E260	Packed column chromatography
AS 3753	UV-visible spectrophotometry
AS 3741	Ion chromatography
AS 3685	Glow discharge mass spectrometry (GD-MS)
AS 3641.2	Inductively coupled plasma spectrometry
AS 3641.1	Arc / spark atomic emission spectrometry
AS 2134.3	Vapour generation atomic absorption spectrometry
AS 2134.2	Graphite furnace atomic absorption spectrometry
AS 2134.1	Flame atomic absorption spectrometry

## 16.3 Microwaves

Any potential for leakage of radiation due to damage, modification or ineffective sealing of microwave equipment must be investigated. This will include the need to evaluate the potential exposure to microwave radiation through quantitative means.

## 17 Records

All work health and safety records must be retained in accordance with JCU's [Records Management Policy](#).

## 18 Related Documents, Legislation and Other Resources

### 18.1 Related Documents and Other Resources

Procedure	<a href="#">HSE-PRO-003 Ionising Radiation Procedure</a>
	<a href="#">HSE-PRO-004 Drugs and Poisons Procedure</a>



	<a href="#">HSE-PRO-009 Biosafety Procedure</a>
	<a href="#">HSE-PRO-005 Hazardous Chemicals Procedure</a>
	HSE-PRO-011 Work Health and Safety Risk Management Procedure
	JCU Records Management Policy <a href="https://www.jcu.edu.au/policy/corporate-governance/records-management-policy">https://www.jcu.edu.au/policy/corporate-governance/records-management-policy</a>
Documents	Lab signage template Decontamination Certificate SOP Template

## 18.2 Regulatory Authorities and Other Relevant Entities

Division of Workplace Health & Safety Queensland

## 18.3 Related Legislation, Codes of Practice and Standards

Legislation	<i>Work Health and Safety Act 2011</i> Work Health and Safety Regulation 2011
Standards	AS/NZS 2243.1:2005 Safety in laboratories - Planning and operational aspects  AS/NZS 2243.10:2004 Safety in laboratories - Storage of chemicals  AS/NZS 2243.2:2006 Safety in laboratories - Chemical aspects  AS/NZS 2243.3:2010 Safety in laboratories - Microbiological safety and containment  AS/NZS 2243.6:2010 Safety in laboratories - Plant and equipment aspects  AS/NZS 2243.8:2014 Safety in laboratories - Fume cupboards
Codes of Practice	Managing Risks of Hazardous Chemicals in the Workplace Code of Practice National Code of Practice for Chemicals of Security Concern

## 19 Administration

NOTE: Printed copies of this procedure are uncontrolled, and currency can only be assured at the time of printing.

### 19.1 Approval Details

Policy Sponsor	Deputy Vice Chancellor, Services and Resources
Version no.	1.0 (16-1)
Date for next Major Review	20/12/2019

## 19.2 Revision History

NOTE: A minor amendment will not result in a change of the next major review date.

*Approval date - the date the Policy Sponsor approved the establishment, minor or major amendment or disestablishment*

*Implementation Date - the date the procedure was published in the Policy Library and is the date the procedure takes effect*

Version	Approval date	Implementation date	Details	Author
1.0 (16-1)	20/12/2016	22/12/2016	Procedure established	HSE Biological, Radiation and Chemicals Safety Advisor

Keywords	[list several relevant key words which may be used to search for and locate the procedure in the Policy Library]
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Consultation Committee	Health, Safety and Environment Advisory Committee (HSEAC)
Contact Unit	<a href="mailto:safety@jcu.edu.au">safety@jcu.edu.au</a>

## 20 Schedules

Not applicable