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**Faculty of Engineering**

**Laboratory Safety Guidelines**

**Bulk Materials Handling Lab**

**Staff/Student Name:** \_\_\_\_\_

## OH&S Induction Acknowledgement

- Must be completed and signed before any work is carried out in the BMH Laboratory.
- After hours access will not be considered if this form is not complete and signed.

1. I have read, and understand this document. I agree to follow all the guidelines set out in this document.
2. I have completed the required induction for the BMH Laboratory.
3. I agree to complete a risk assessment before any work is undertaken in the BMH laboratory.
4. I am trained to use the following equipment:

Student/Staff Name: \_\_\_\_\_ Student/Staff Number: \_\_\_\_\_

Student/Staff Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Induction Date: \_\_\_\_\_ Trainer's Signature: \_\_\_\_\_

Trainer's Name: \_\_\_\_\_

Academic Supervisor's Name: \_\_\_\_\_ Date: \_\_\_\_\_

Academic Supervisor's Signature: \_\_\_\_\_

*Copies: Lab/Workshop files*

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## 1. Introduction

The laboratory contains many potential safety hazards. However, with proper control these hazards can be eliminated. This manual is intended to outline the basic laboratory safety requirements for the BMH laboratory.

## 2. Responsibilities

The responsibility for implementation of these procedures rests with the Deans and Heads of School. The Faculty of Engineering Workplace Advisory Committees will provide advice and feedback to Deans and Heads on actions needed to comply with these procedures. These groups will be able to seek advice from Occupational Health & Safety Unit.

### 2.1 Deans and Heads of School

Heads of Cost Centres have an overall responsibility for ensuring that occupational health and safety standards and practices are implemented and maintained in the teaching facilities, laboratories and studios by their respective supervisory staff.

To achieve compliance, Deans and Heads of School should:

- ensure that staff and students receive the appropriate information, instruction and training necessary for them to perform work safely;
- ensure that all staff and students receive an induction that includes information pertaining to emergency response procedures and personnel;
- ensure that local occupational health and safety procedures are developed, documented and issued to staff and students as appropriate;
- ensure that the facilities and equipment provided for staff and students are safe and suitable for the types of work to be carried out;
- ensure that adequate financial provisions are made for occupational health and safety equipment and materials and the maintaining of occupational health and safety standards;
- ensure that hazard identification and risk assessment procedures are developed, documented and maintained for the use, handling, storage, transport and disposal of equipment, materials and substances and that appropriate risk controls are implemented and maintained;

### 2.2 Supervisors and Subject Coordinators Of Honours And Postgraduate Students

As honours and postgraduate research is major aspect of work undertaken in laboratories, it is essential that adequate supervision is provided to maintain safety. Supervisors and subject coordinators are to:

- Actively practice and develop in their students proper attitudes towards occupational health and safety matters;
- Control the risks associated with the work that they supervise using a documented risk management process;
- Ensure that safe work practices are developed and maintained at all times;

- Arrange for their staff and students to be instructed in safe and healthy work procedures, and ensure that they are fully informed about particular hazards, and how to avoid, eliminate or minimise them;
- Ensure that good housekeeping standards are developed and maintained in the areas under their control;
- Ensure that staff and students under their control use safety equipment provided in a correct manner;
- Ensure that all students understand the disciplinary procedures that will be invoked for non-compliance with occupational health and safety instructions, policies and procedures;
- Ensure that all incidents, hazards and 'near miss' incidents that occur are reported on the [hazard & incident report form](#).

### 2.3 Staff and Students

All staff and students who undertake work in laboratories must take reasonable care of their own health and safety and the health and safety of others by:

- Taking action to avoid, eliminate or minimise hazards of which they are aware;
- Complying with all occupational health and safety instructions, policies, and procedures including departmental safety manuals;
- Making proper use of all safety devices and personal protective equipment;
- Complying with the instructions given by emergency response personnel such as emergency wardens and first aiders;
- Not willfully placing at risk the health and safety of any other person;
- Seeking information or advice where necessary before carrying out new or unfamiliar work;
- Maintaining dress standards appropriate for the work being done. Appropriate protective clothing and footwear must be worn at all times;
- Only consuming or storing food and drink in designated areas;
- Being familiar with emergency and evacuation procedures and the location of, and if appropriately trained, in the use of, emergency equipment;
- Reporting all incidents, hazards and 'near miss' incidents on the [Hazard & Incident Report form](#).

## 3. Safe Conduct

The following recommendations detail the standard behavior for all personnel working within a laboratory.

- (a) Never adopt a casual attitude in the laboratory and always be conscious of the potential hazards.

- (b) Ensure that personal clothing is suitable to the BMH laboratory conditions, e.g. Safety footwear with steel capping. Singlets, tank tops or similar clothing are not suitable for wearing in laboratory.
- (c) Always wear eye protection when using power operated hand or machine tools, or while performing physical tests that could lead to eye damage.
- (d) Use protective clothing and devices appropriate to the type of operation being carried out, giving due consideration to the work being carried out in the vicinity.
- (e) Never run in the laboratory or along corridors.
- (f) Never indulge in reckless behavior in the laboratory.
- (g) Always exercise care when opening and closing doors and entering or leaving the laboratory.
- (h) Do not carry out any work in isolation in a laboratory; ensure that at least a second person is within call.
- (i) Do not handle, store or consume food or drink in the laboratory.
- (j) Do not store food or drink in a refrigerator, which is used to store laboratory materials.
- (k) Do not smoke within any university building.
- (l) Regard all substances as hazardous unless there is definite information to the contrary.
- (m) Before any work is carried out in the laboratory, permission must be obtained from the officer in charge. Never undertake any work unless the potential hazards of the operation are known as precisely as possible, and the appropriate safety precautions are adopted. Any flame producing activity is not to commence until the immediate area has been cleared of dusts. Many materials, which are nonflammable in a lump state, become quite volatile when in powdered or dust cloud form.
- (n) All materials coming into the laboratory are to be accompanied by documentation detailing the material source, type, quantity and any known characteristics. Particularly those relating to hazardous materials. This documentation is to be stored in a file specifically for this purpose and is to be readily available to all staff. All material is to be kept in suitable containers, which are to be clearly labeled with a number from a drum register book, which in turn is to contain details of the material, its source and ownership.
- (o) At the conclusion of testing of any material, proper arrangements are to be made for the safe disposal of that material, either to acceptable conventional waste depots, or returned to the client, depending on the nature of the material and what was agreed with the client prior to commencement of testing.
- (p) If, during the testing or handling of materials, spillages occur for any reason, correct clean-up procedures must be followed as per the Material Safety Data Sheet that accompanied the material on its arrival.
- (q) If a bulk material is found to be on fire (e.g. inside a bin or on the ground), then under no circumstances should the combustibles be disturbed in any way. Otherwise, a dust cloud and explosion could occur. Special procedures are required to deal with such situations depending on the material and circumstances. (e.g. careful/gentle inerting of fire; special 'muck sucker' with water mixing nozzle at entrance of suction hose; water

mist/spray gently quenching combustibles; sealing off combustion process and allowing 'fire' to burn itself out) depending on the material and circumstances.

- (r) Take additional care when carrying or moving any potentially hazardous substance.
- (s) Never store mutually reactive substances in the same area. (See relevant State authority guidelines.)
- (t) Keep only the minimum required quantities of hazardous substances in the laboratory work area.
- (u) Warning signs and barriers are to be erected at entrances to the laboratory before any testing is carried out when using materials of an excessively dusty nature, or are toxic or otherwise unpleasant.
- (v) Wash skin areas, which come in contact with chemicals, irrespective of concentration.
- (w) Keep all fire-escape routes completely clear at all times.
- (x) Label all safety equipment and maintain it in good operating condition. Check and inspect safety equipment for correct operation in accordance with the manufacturer's instructions and report, in writing, any requirement for maintenance.
- (y) Ensure that all safety equipment remains accessible to the laboratory personnel at all times.
- (z) Keep safety information and emergency procedures prominently displayed at all times in each laboratory. Include in the safety information, the telephone numbers of:
  - i) fire brigade;
  - ii) ambulance;
  - iii) safety officer;
  - iv) hospital;
  - v) police and
  - vi) Security

#### 4. Housekeeping

Housekeeping is an important component in laboratory safety to ensure risk of injury from potential hazards in the environment are controlled. The following precautions are to be taken to ensure the safety of personnel within laboratories:

- Floors are to be kept tidy and dry
- Benches are to be kept clean and free from chemicals and apparatus that are not being used.
- Aisles and exits are to be kept free from obstructions.
- Bottles and glassware are to be kept off the floor.
- Access to all emergency equipment (fire extinguishers, first aid kits and eyewashes) are to be kept free from obstruction.
- Work areas and equipment are to be thoroughly cleaned after use.
- If last to leave the laboratory, make sure equipment is turned off.

- If contractors are working in your area, make known to them any hazards that may exist in your area, i.e. flammable liquids, dusts.

## 5. Emergency Procedures (displayed clearly in Lab/Workshop)

In the event of fire or other emergency that may endanger staff and students the following procedures apply -

- In the event of a fire alert others in the immediate area. Then dial 0-000 (from university phone) and ask for the Fire Brigade and give details. Call security, 4900, and inform them of the fire and its location.
- Inform the nearest Warden or Departmental Head.
- When an alarm is raised proceed quickly to the nearest exit as directed by an Evacuation Official.
- After leaving the building proceed as directed to the marshalling area (Area A, Oval No.3 for BMH Laboratory). Do not return to the building until the "All Clear" is given by the Security Manager or delegate.

## 6. Safety Equipment

Laboratories at the University are equipped with a number of safety features.

### 6.1 Eye Wash Sprays

There are two tap mounted sprays provided in the BMH laboratory to flush the eyes if chemicals or dust are splashed into them. In the event of chemicals splashing in the eyes, the stream of water from the spray should be directed into the eye for a period of 15 minutes before seeking medical attention. It is up to you to familiarize yourself with the location of these eye wash sprays before commencing work.

### 6.2 Fire Extinguishers

This equipment is provided in all laboratories to extinguish minor fires only. If there is any risk from the fire the building should be evacuated. Before using a fire extinguisher read the instructions ensuring that it is appropriate to the type of fire.

*Water Type Extinguisher* - Colour coded red. For use on solids fires only. Not to be used on electrical or chemical fires.

*Carbon Dioxide Extinguisher* - Colour coded red with a black band. For use on electrical and flammable liquids fire - It should be noted that this extinguisher can be safely used on all types of fires, however when gas dissipates re-ignition can take place.

## 7. Gas Cylinders - Compressed & Liquefied Gasses

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

- |           |   |
|-----------|---|
| Class 2.1 | Flammable gases identified by a red dangerous goods diamond (e.g. butane) |
|-----------|---|

Class 2.2	Non-flammable and non-toxic gases identified by a green dangerous goods diamond (e.g. helium)
Class 2.3 ammonia)	Poisonous gases identified by a white dangerous goods diamond (e.g.

In instances where the gas presents multiple hazards additional diamonds indicates the subsidiary risks. For example, Chlorine Class 2.3 (toxicity) and Class 5.a (oxidising agent)

## 7.1 Moving Cylinders

The majority of accidents involving gas cylinders occur while moving them from one location to another. The following control measures should be used to reduce the potential for an accident:

- The use of purpose-built trolleys or other suitable devices for gas cylinder transportation.
- Securing the gas cylinder's valve, disconnecting and removing associated distribution equipment.
- Shutting the cylinder's valve, disconnecting and removing associated distribution equipment.
- A requirement that only properly trained personnel are permitted to move cylinders.
- Laboratory procedures preventing the manual movement of larger gas cylinders.

## 7.2 Storage of Gas Cylinders

The guidelines for the storage of gas cylinders are detailed in AS 4332 The Storage and Handling of Gases in Cylinders. For more information please refer to the AS 4332.

The following table outlines the quantities described as 'minor storage' of gases in cylinders.

Class of Gas	Maximum aggregate water capacity, litres
2.1	500
2.2	2000
2.2, with class 5.1 Subsidiary risk	1000
2.3	50

Where gases of mixed classes are kept in minor storage, the aggregate quantity of all gases shall not exceed 2000 litres and the quantity of each subclass shall not exceed that given in the table above.

The following precautions shall be observed for minor storage and handling of gas cylinders:

- Gas cylinders are to be kept away from artificial sources of heat, i.e. radiators, boilers or steam pipes; and kept clear.
- Gas cylinders shall be provided with adequate ventilation at all times.
- Classes of gas cylinders shall be segregated within the store, but need not be separated.
- Outdoor storage of Class 2 cylinders shall be separated from other dangerous goods by 3 metres. They shall not be less than 1m from any door, window, air vent or duct.

- All gas cylinders are to be secured in the upright position by chain or other means to prevent falling

Indoor storage of gas cylinders should be avoided wherever possible. However where it is not reasonable to have an outdoor cylinder and reticulation system, the keeping of gas cylinders shall incorporate a risk management approach. Specific precautions, which a risk assessment is to include, would be:

- The total capacity of gas in cylinders allowed for any particular indoor location shall include cylinders in use, spare cylinders not in use, and used cylinders awaiting removal.
- The total capacity of the gases kept shall not exceed one minor storage quantity per 200 m<sup>2</sup> of floor area. Where the floor area exceeds 200m<sup>2</sup> any arrangement which results in an undue concentration of cylinders shall be avoided.
- Indoor minor stores of gases in cylinders shall be separated from other minor stores of gases or other dangerous goods stores by a minimum distance of 5 m.
- Except for Class 2.2 gases having no subsidiary risks, there shall be no minor storage in basements.
- Where cylinders are kept inside a building or a confined area, e.g. a shipping container, that building or area shall be adequately ventilated by natural air movement or equivalent.

## 8. Working Alone

Working alone refers to situations where people may be exposed to risks because:

- the area they are working in is remote from others or isolated from the assistance of others because the nature, time or location of their work; or
- it involves the operation or maintenance of equipment, or the handling of a hazardous substance; or
- the work is dangerous for a person to perform alone.

Where any of the above is applicable, working alone must be avoided.

An assessment of the risks associated with each identified working alone situation shall be completed in consultation with those working alone to formulate practical solutions to manage working alone situations. The risk assessment should be completed in accordance with the [Risk Management Guidelines](#).

The risk assessment shall include arrangements for adequate communication systems for regular monitoring. Arrangements can be made prior to the commencement of work with Campus Security to notify arrival and departure details.

## 9. After Hours Access

Normal operating hours for the BMH laboratory is Monday to Friday, 8am to 4pm. During these times technical staff are available to monitor the operations of the laboratory. Anyone requiring access outside of normal operating hours is required to have formal approval.

It is important that the Working Alone guidelines and Risk Management Guidelines be followed at all times – see above.

It is a general rule that undergraduate students DO NOT have after hours access. Undergraduate students requiring after hours for a specific time or a specific purpose must apply to the Dean of Engineering on the appropriate form. The form must be authorised by the relevant Academic Supervisor and a copy of the OH&S Induction Acknowledgement form (page 2) must be attached.

Research Students requiring after hours access are required to have an approved After Hours Access form. Before being approved by the Dean, the After Hours Access forms must be approved by the Academic Supervisor and have a copy of the OH&S Induction Acknowledgement form (page 2) attached.

When working after hours the completed After Hours Access form and Student ID, must be available for inspection by Faculty Staff or Security. If not, you will be required to leave the laboratory immediately.

Students (and any accompanying person) must sign in and out of the laboratory, using the sign on books provided outside office 6.G18a. The name(s), time of entry, mobile phone number (if available) must be recorded for all persons entering the laboratory.

All persons working after hours must have an accompanying person with them. This person must be over 18 years of age and be briefed on emergency procedures and phone contact numbers by the staff/student having access to the laboratory.

In general:

- Ensure that the doors of buildings are securely closed and locked after entering and leaving the building.
- Ensure that the doors to internal areas are secured on leaving.
- Ensure that you are familiar with the safety rules and emergency contact numbers (displayed in laboratory).
- Report to University Security any breaches of security or suspicious behaviour.
- Do not give anyone else security codes, keys or access cards.
- Do not provide access to buildings to unauthorised persons.

No equipment may be operated unless:

- Two persons are present.
- The operator has received training in its use.
- You have permission to use the equipment.

A breach of any of the conditions will result in after hours access being immediately cancelled. Any future request for after hours access will require personal consultation with the Dean of Engineering.

## 10. Program Review

As part of a continuous improvement system this program shall be reviewed on a regular basis or upon recommendation of the OHS Central Committee. A review by the OH&S Unit will take place biannually.