

WHS OP028 Hazardous Chemical Storage Procedure

Section 1 - Overview

(1) Many chemicals have specific storage requirements because of their physical properties. The hazards or risks associated with chemical storage can include one or a combination of the following:

- a. Chemicals that become unstable over time that may result in fire or explosion;
- b. Chemicals that are temperature sensitive;
- c. Chemicals that are shock sensitive;
- d. Chemicals that have particular physical properties rendering them incompatible with chemicals with another physical property;
- e. Chemical packaging that becomes damaged and leaks;
- f. Chemicals that are decanted into inappropriate or unlabelled containers;
- g. Chemical storage arrangements that introduce additional hazards associated with the chemical; and
- h. Chemical licensing conditions or constraints that affect storage requirements.

(2) Storage arrangements should be identified during the chemical risk assessment and appropriate provisions provided. Storage requirements are specified on the Safety Data Sheet (SDS).

(3) Consideration should also be given to the quantities that will be stored, particularly as bulk storage areas may require additional signage and controls.

Section 2 - Scope

(4) This procedure applies to all University facilities and operations where hazardous chemicals are stored.

Section 3 - Procedure

Minimising the Quantities Stored

(5) One of the most important ways of reducing the risk arising from stored chemicals is to keep the quantities to a minimum. In particular the quantity of chemicals kept on shelves and benches should be as low as practical. Where higher quantities of chemicals cannot be avoided, special storage provisions must be made.

Special Storage Provisions

(6) Depending on the class and quantity of goods being stored it is necessary to determine the type of special storage that is acceptable:

- a. Safety cans for solvent (particularly suitable for flammable liquids);
- b. Fire-rated storage cabinets (flammable liquids, oxidising agents, corrosives);
- c. Storage compartment within a building or isolated storage building; and
- d. Storage in tanks or other bulk storage.

Location of Storage

(7) Separation must be established from adjoining premises and on-site facilities (other chemical stores, processing areas or occupied buildings) to take account of the risk of:

- a. Heat from a fire risk of ignition;
- b. Explosion blast damage and projectiles;
- c. Toxic combustion products from a fire; and
- d. Toxic gases or vapours from a leak or spillage.

(8) These separation distances may be achieved by separation distances (sometimes referred to as safety distances) or by the use of fire resistant construction to a high standard (e.g. a 4 hour fire resistant wall encloses the store).

Separation of Risks

(9) As a general design principle there should be separation between:

- a. High hazard materials (chemical stores);
- b. High energy sources (manufacturing areas, major roadways);
- c. Areas occupied by people (offices, retail areas);
- d. Critical resources (computer records etc.); and
- e. Critical or high value materials (raw materials or finished product).

Segregation of Incompatible Classes

(10) Incompatible classes of dangerous goods (or incompatible chemicals within a class) must be segregated by distance or fire-rated walls to prevent:

- a. Hazardous interaction between chemicals (e.g. flammable liquids and oxidising agents, acids and alkalis, cyanide salts and acids); or
- b. Risk of a fire leading to hazardous involvement of adjacent materials (e.g. spontaneously combustible goods adjacent to flammable liquids or poisons).

Package Condition

(11) In order to minimise the risk of exposure of workers and to minimise wastage of stock it is essential to undertake regular checks of containers for chemicals to:

- a. Check that they are properly sealed (where appropriate);
- b. Ensure the container is not damaged; and
- c. A legible label is attached to the container;

(12) Keep containers out of direct sunlight and exposure to rain where UV light or water can cause degradation or harmful reaction with the chemicals.

Construction Materials for Chemical Stores

(13) Where a separate chemical storage facility is required, it should take account of the need for:

- a. Non-combustible construction materials;
- b. Construction materials that are not damaged by the goods being stored (eg. exposed steel and acids) and which do not add to the risk of the stored goods (eg. zinc and copper with ammonium nitrate);
- c. Electrical equipment suitable for hazardous locations; and
- d. Pipes, valves and tanks designed to appropriate standards.

Layout and Aisles

(14) The layout and aisles within chemical stores should enable ready access to the stored goods by manual or mechanical means that are commensurate with good manual handling practice - aisles at least 750 millimetres in width and have at least 500 millimetres clearance each side where fork lifts are used.

(15) Where chemicals are stacked they should only be stacked to such a height which ensures that containers do not break if they fall, and that the crushing strength of containers is not exceeded.

(16) Where containers are kept on shelves in work areas, the shelves should be no higher than shoulder-height to avoid the dangers of stretching dangerously to retrieve chemicals from shelves.

(17) Shelves should be wider than the containers to be stored on them, but the practice of storing chemicals several rows deep on shelves should also be avoided.

(18) Larger and heavier containers should be kept at about waist height to avoid the need for difficult bending to retrieve them, or the increased risk of their falling if placed on high-level shelves.

Ventilation

(19) Natural and/or mechanical ventilation must be provided in a chemical storage area to ensure that:

- a. Flammable atmospheres do not accumulate (concentration of flammable vapours should be well below the lower flammable limit); and
- b. Toxic or harmful gases, vapours, mists or dusts are not present at levels above the workplace exposure standard.

Flammable and Combustible Liquids: Minor Quantities

(20) Minor quantities of flammable and combustible liquids may be stored on open shelves or work benches. However, as storage in an enclosed space provides a high level of protection in the event of fire, it is recommended that the quantities stored in the open be kept to a minimum. Flammable and combustible liquids should not be stored on the floor.

(21) The following minor quantities limits are provided for guidance within the University.

- a. Offices - 5 litres / floor
- b. Laboratories - 10 litres / 50 m² floor area
- c. Workshops - 100 litres

(22) Where flammable liquids are kept on benches or shelves or in cupboards in quantities less than the limits set for minor quantities, the Australian standard AS/NZ 1940 requires the following minimum safe working procedures to be followed:

- a. Flammable and combustible liquids must be stored away from ignition sources (e.g. flames, electrical equipment, grinding and cutting operations) and excessively hot locations;
- b. When carrying containers of flammable and combustible liquids care must be taken to minimise the possibility of spillage and fire. Properly designed carriers should be used for 'Winchester' sized containers (2 to 4 litres);
- c. Any action to open or decant from a container of flammable liquid must be carried out in a well ventilated area and sufficiently distant from any potential ignition source so as to ensure safety having due regard to the quantity being handled;

- d. Combustible wastes or residues must not be kept or left in areas where flammable or combustible liquids are stored or decanted;
- e. Materials that might interact dangerously with flammable and combustible liquids must be stored separately from them. In particular oxidising agents must be stored separately;
- f. All people handling flammable and combustible liquids must be familiar with their hazardous properties and the necessary safety procedures for handling them.
- g. Any spillage must be cleaned up immediately - refer to WHS OP025 Hazardous Chemicals Spills Procedure;
- h. The quantity of flammable and combustible liquids should be kept to a minimum. In particular the number and size of containers kept on open benches or shelves should be kept as low as practical taking account of day-to-day requirements;
- i. Special safety cans for flammable liquids may be purchased for areas where there is a high level of use;
- j. Flammable and combustible liquids must not be stored or used where they may jeopardise escape from a room or building in the event of a fire.
- k. Where the quantities of flammable liquids stored is greater than 100 litres:
 - i. A fire extinguisher appropriate to class B fires must be provided (dry chemical or carbon dioxide); and
 - ii. A warning sign must be displayed.

Flammable and Combustible Liquids: Larger Quantities

(23) Where the quantities stored exceed the minor quantities limits, flammable and combustible liquids must be stored in an approved flammable liquids cabinet. Schools/Directorates requiring a flammable liquids cabinet should contact FMS for assistance.

(24) The maximum quantity that may be stored in a flammable liquids cabinet is 250 litres. Schools/Directorates should not keep quantities in excess of this limit.

Compressed Gases

(25) Compressed gas cylinders are commonly used within laboratories. As far as practical, compressed gas cylinders should be stored outside of buildings and the gas reticulated to points of use.

(26) External storage areas should be secured against damage and tampering and be clear of combustible materials.

(27) Gases should not be reticulated at full cylinder pressure and the system should be provided with regulators at the cylinder.

(28) The need for high and low pressure cut-off devices should be considered to protect against disconnection of equipment or failure of the regulator.

(29) Where possible, gas lines should not be located inside building cavities. All gas lines should be pressure tested before use.

(30) Where the use of cylinders within buildings is unavoidable, they should be firmly secured to walls and kept clear of room exits, corridors and fire hazards.

(31) Gas cylinders should only be moved using a properly designed cylinder trolley. During transport gas cylinders must have the cylinder valve firmly closed, all regulators and similar attachments removed, and where provided the cylinder valve cover should be in place.

Authority and Compliance

(32) The Procedure Administrator, pursuant to the University's Work Health and Safety Rule, makes these procedures.

(33) University Representatives and Students must observe these Procedures in relation to University matters.

(34) These Procedures operate as and from the Effective Date.

(35) Previous Procedures relating to WHS OP013 (Interim) Hazardous Chemicals Procedure are replaced and have no further operation from the Effective Date of this new Procedure.

Section 4 - Definitions

(36) Effective Date means takes effect on the day on which it is published or on such later day as may be specified in the procedure.

(37) Hazard means a situation or thing that has the potential to harm a person, property or the environment.

(38) Hazardous Chemical means any substance, mixture or article that satisfies the criteria for a hazard class in the Globally Harmonised System of Classification and Labelling of Chemicals (GHS).

(39) University Representative means a University employee (casual, fixed term and permanent) contractor, agent, appointee, UNE Council member, adjunct, visiting academic and any other person engaged by the University to undertake some activity for or on behalf of the University. It includes corporations and other bodies falling into one or more of these categories

(40) Student means an Admitted Student or an Enrolled Student, at the relevant time.

a. Admitted student means a student who has been admitted to a UNE course of study and who is entitled to enrol in a unit of study or who has completed all of the units in the UNE course of study.

b. Enrolled student means a student who is enrolled in a unit of study at UNE.

(41) UNE Act means the University of New England Act 1993 No 68 (NSW).

(42) A Worker, as defined by the WHS Act, is a person that carries out work in any capacity for a person conducting a business or undertaking, including work as:

a. An employee;

b. A contractor or subcontractor;

c. An employee of a contractor or subcontractor;

d. An employee of a labour hire company who has been assigned to work in the person's business or undertaking;

e. An outworker;

f. An apprentice or trainee;

g. A student gaining work experience;

h. A volunteer; or

i. Person of a prescribed class.