1. PURPOSE

To provide information on the prevention of spills and/or manage and respond to spills if they occur.

Local areas must ensure that appropriate trained personnel, procedures and materials are available to prevent or minimise a spill. In the event of a spill appropriate emergency procedures, including spill kits, should be in place to mitigate or reduce adverse outcomes.

This guidance material discusses:

- spill prevention and minimisation
- properties of materials that may be contained in a spill kit; and
- selection and use of these materials.

2. SPILL PREVENTION AND MINIMISATION

Spills can be prevented in the workplace by:

- ensuring appropriate and compatible chemical containers are used (for example: glass containers for corrosive chemicals);
- ensuring seals on containers are in good condition;
- ensuring all chemicals are stored appropriately. This may include:
    - locked cupboards and storage areas;
    - purpose built dangerous goods cabinets including:
        - ongoing inspection and maintenance of the cabinet. Refer to:
        - Health & Safety: Procurement and maintenance of dangerous goods storage cabinets
    - bunded trays or purpose-built chemical storage with inbuilt spill retention; and
    - storage and segregated into respective Dangerous Goods Classes. Refer to:
        - Health & Safety: Chemical storage and handling for minor quantities in laboratories
        - Health & Safety: Dangerous goods segregation and storage requirements
- ensuring appropriate equipment and procedures are in place for decanting chemicals including:
    - automated dispensing units;
    - appropriate equipment for decanting chemicals (i.e. easy pour funnels, trays, containers etc.);
    - personal protective equipment (PPE) such as gloves, goggles, coats/aprons etc.; and
    - standard operating procedures (SOP) for decanting chemicals.

- ensuring staff, students, contractors and others have appropriate training in chemical management, local area induction and risk assessments/standard operating procedures.

In the event of a spill local area emergency procedures, including spill kits, should take into account the substances used in the area and the appropriate method for responding to the spill.

3. SPILL KITS

3.1. Types of spill kits

Spill kits can contain absorbent material, neutralising material, or a mixture of both.

The contents of a spill kit should be appropriate for the substance that may be unintentionally released. The substances at risk of spilling can be determined during the risk assessment process.

A spill kit should contain as a minimum:

IF THIS SUBSTANCE IS PRESENT	THIS EQUIPMENT/MATERIAL IS REQUIRED
Non-oil-based liquids	• Absorbent material or pads, and booms
Oil	• Absorbent material or pads, and booms
Acids and Alkalis	• Neutralising material
Biohazards	• Neutralising material
Radiological	• Absorbent material or pads, and booms
All substances	• Personal protective equipment appropriate for the substances present. Could include: face shield, gloves, rubber boots, respiratory protection and/or coveralls. • Safety signage, for example: DO NOT ENTER: CHEMICAL SPILL CLEANUP IN PROGRESS.

These materials and equipment are available as commercially prepared kits, such as those supplied by the University's hazardous waste contractor. Local areas can also assemble their own kits using the University's Iprocurement platform.

TYPES OF SPILL KITS	
	
Commercial Spill Kit	**Self-Assembled Spill Kit**

3.2. Materials in spill kits

Absorbent materials

Vermiculite

Vermiculite is a hydrous, silicate mineral that expands greatly when heated. Exfoliation occurs when the mineral is heated sufficiently.

It is a lightweight, non-reactive, inert material that will absorb up to ten times its own weight in water. It can be difficult to use outdoors as its low weight makes it prone to blow away. It does not absorb oil-based products easily. It is relatively cheap and can be re-used.

Attapulgite

Attapulgite is also known as **diatomaceous earth** and **kitty litter**. It is a naturally occurring, soft, siliceous sedimentary rock that is easily crumbled into a fine white to off-white powder. Its origin is the fossilised remains of diatoms, a type of hard-shelled algae.

It is a cheap, lightweight, non-reactive, inert material best for use on oil-based chemicals and outdoor spills.

It is not as lightweight or absorbent as vermiculite.

Absorbent pads and booms

Absorbent pads and booms (sometimes known as **sausages**) are made from inert, synthetic or natural materials. Pads are used to soak up spilt materials. Booms are used to stop spilt materials entering drains and storm water outlets.

Neutralising materials

Sodium hydrogen carbonate

Sodium hydrogen carbonate is also known as **baking powder** and **sodium bicarbonate**. It normally appears as a fine white powder that is mildly hydroscopic. It can be used to neutralise both acids and alkalis.

Given time to completely react with spilt acid, it leaves a residue of salt water. The amount required will depend on how strong the acid or alkali is. For example, for a strong sulfuric acid solution, 2 kilograms per litre would be needed.

Nanoparticle-sized metallic oxides (NSMO)

Nanoparticle-sized metallic oxides are five nanometers in size and can be used much like a fire extinguisher. NSMO may be stored in a pressurised container with a handle and nozzle for release, or they may be poured from a container. NSMO will neutralise acids and alkalis, corrosive gases, toxic gases, oxidizing gases, common organic solvents, mercaptans and volatile organic compounds (VOCs).

While expensive, NSMO are non-toxic and extremely effective.

Sodium carbonate anhydrous

Sodium carbonate anhydrous is also known as **soda ash** and **washing soda**. It normally appears as a slightly course white powder. Having a pH of 11.6, it is a very effective neutralising agent for strong acids. For example, with a strong sulfuric acid solution, 1 kilogram per litre would produce a residue of salt water with a pH between 6 and 10.

Sodium hypochlorite

Sodium hypochlorite is commonly referred to as **bleach**. It can be used to neutralise biological spills. These may include blood, vomit, faeces, bacteria, spores, and tissue samples of human or animal origin.

PLEASE NOTE:
Sodium hypochlorite will lose chlorine at the rate of approximately 1% per month while in storage. This rate will increase if the container is exposed to sunlight or heat.

Date: April 2019 **Version**: 1.2 **Authorised by**: Manager, Health & Safety, Operations **Next Review**: April 2024

The chlorine in the bleach reacts with the organic matter, killing it, and in the process turns into salt and water. The neutralised spill can then be removed with absorbent material such as paper towel.

TYPE OF SPILL	DESCRIPTION OF SPILL KIT
Acid	• NSMO or sodium hydrogen carbonate or sodium carbonate anhydrous • Vermiculite or absorbent pads • Personal protective equipment (PPE) as determined by the emergency risk assessment and the Safety Data Sheet (SDS)
Alkali	• NSMO or sodium hydrogen carbonate • Vermiculite or absorbent pads • PPE as determined by the emergency risk assessment and the SDS
Biological	• Bleach **or** hospital-grade disinfectant • Vermiculite or absorbent pads or paper towel • PPE as determined by the emergency risk assessment and the SDS
Flammable liquids and other liquids	• NSMO • Vermiculite or absorbent pads • PPE as determined by the emergency risk assessment and the SDS
Oil	• Attapulgite or absorbent pads • PPE as determined by the emergency risk assessment and the SDS
Radiological	• Vermiculite or absorbent pads • PPE as determined by the emergency risk assessment and the SDS Monitoring • Contamination meter should be available

4. PERSONAL PROTECTIVE EQUIPMENT (PPE)

A risk assessment for a chemical or laboratory process must consider emergency situations and must specify the PPE that is required when responding to a spill.

- **Requirements for all spills**: eye and face protection, and suitable gloves.
- **For chemical spills:** chemical resistant footwear and chemical resistant clothing are required.
- **Respiratory protection** may be needed depending on the hazards associated with the chemicals and the quantity present in the workplace.
    - If respirators are selected, they must be of the full-face type and have a universal cartridge that will protect from corrosive gas, toxic gas, organic solvents, chlorinated solvents, dusts, mists and fumes.
    - Cartridges have a shelf life of five years from the date of manufacture when stored in their undamaged original packaging. When removed from their packaging, their life span is reduced to six months. Therefore, when opening the manufacturer's packaging, write the opening date on the cartridge in indelible pen. Checking the use-by-date of respirator cartridges should be an item on the area's cyclic events checklist.

5. DISPOSAL OF SPILT MATERIAL

After a spill has been neutralised and/or absorbed, it can be disposed of through the University of Melbourne hazardous waste contractor.

Date: April 2019 **Version**: 1.2 **Authorised by**: Manager, Health & Safety, Operations **Next Review**: April 2024

The spill must be stored in a container that is fit for purpose and appropriately labeled. For example, most neutralised substances can be placed in twenty-litre sealable pails. The label must show:

- substance name;
- department name and number;
- dangerous goods class label (if applicable);
- packaging group;
- type of waste; and
- volume.

6. REFERENCES

- *Dangerous Goods (Storage and Handling) Regulations 2012* (Vic)
- *Occupational Health and Safety Act 2004* (Vic)
- *Occupational Health and Safety Regulations 2017* (Vic)
- Health & Safety: Chemical management requirements
- Health & Safety: Ionising radiation requirements
- Health & Safety: Waste management requirements
- Biosafety
- Health & Safety: Personal protective equipment requirements

For further information, contact your local Health and Safety Business Partner.

Date: April 2019 **Version**: 1.2 **Authorised by**: Manager, Health & Safety, Operations **Next Review**: April 2024