Chemical Management Guidelines
Faculty of Science, Engineering & Built Environment

Date of last review: October 2017 Reviewed by: Manager, Health Safety & Environment (SEBE)

These guidelines have been developed to assist with **safe and correct management of chemicals** in work areas managed by the Faculty of Science, Engineering and Built Environment. These guidelines supplement the information provided about chemical safety in the University OHS Manual.

Chemical Management resources

The following documents are accessible on the SEBE Health, Safety and Wellbeing site

- *Chemical Management Guidelines (SEBE)* (This document)
- *Chemical Risk Assessment form* (excel template)
- *Completed and approved forms from other users in the Faculty*

Responsibilities

Supervisors are responsible for:

- Ensuring risk assessments and SOPs are carried out for the storage and handling of hazardous chemicals
- Checking and verifying the risk assessment and the proposed control measures
- Verifying that control measures have been put in place and are adequately controlling the identified hazards
- Ensuring all workers under their supervision are adequately trained in the safe handling of any hazardous chemicals that are required in the work

A Worker is the person directly controlling a project on a daily basis. The Worker is responsible for:

- Providing all the necessary information to carry out a hazard identification and risk assessment
- Investigating and implementing all the necessary control measures
- Documenting the risk assessment
- Ensuring the control measures continue to work effectively and are adequately controlling the identified hazards
- Informing the Work Supervisor of any incident, information or result that reduces the validity or effectiveness of the initial risk assessment

Technical staff may provide advice or assistance with any of the above when hazardous chemicals are used in research areas, but this does not reduce the direct responsibility of the Supervisor and Worker to ensure that chemical management is carried out correctly.

Section 1 – SEBE Risk Category System

1.1 Banded category system

The Faculty of Science, Engineering and Built Environment has devised a banded category system for hazardous substances, where they are allocated into Risk Category 3, 4 or 5 based on GHS phrases. You will find all listed GHS phrases with associated risk categories in Appendix 1 of these Guidelines or the second tab of Chemical Risk Assessment form.

1.2 Assigning a chemical's risk category

Risk category is determined by the highest category of GHS statement.

E.g. Ethanol (100%) = H225 (risk category 4) H319 (Risk category 3)
Therefore it is classified as a risk category 4 chemical

1.3 How to find a chemical's GHS phrases

GHS phrases can be found on SDS, but these can differ depending on the manufacturer. The most accurate source of GHS-phrases is the Hazardous Substances Information System (HSIS) maintained by Safe Work Australia. It is a valuable resource, accessed here:
http://hcis.safeworkaustralia.gov.au/HazardousChemical

1.4 Safety Data Sheets

The University subscribes to Chemwatch, a third-party supplier of SDS. Chemwatch collects SDS from suppliers as well as providing a 'Chemwatch-version' SDS for most chemicals. Chemwatch also produce a one-page mini-SDS which covers information that would be needed at a glance. Chemwatch is available from any computer with a University IP address.

1.5 Dilution of chemicals

The dilution of a chemical can reduce the Risk Category. The GHS Guidelines Chapter 3 and 4 lists the cut-off levels where GHS phrases change to less- hazardous versions. A summary of these cut-off can also be found on the second tab of the Chemical RA form.
Note, currently no dilution tables provided for flammable liquid concentrations as GHS classification is based on cut-off points.
Consider different concentrations of sodium Oxalate

100%	10%	3%	1%	0.5%
315, 318, 302, 312	315, 318	318	319	-
	LD50 (1,500mg/kg) 302, 312	LD50 (300mg/kg) 302	LD50 (250mg/kg) -	

1.6 Chemicals classified under the GHS

Victoria has agreed to adopt the GHS system of classification and labelling to be enforced by July 2017. GHS-classified chemicals have a H-phrase instead of R-phrase, which is used for risk banding. The risk categories of all H-phrases are listed in Appendix 1, or on the Chemical Risk Assessment form.

Section 2- Requirements by Risk Category

2.1 Risk Category 3 chemicals

Chemicals in Risk Category 3 are considered to be of low to moderate risk, when no control measures are used. When standard control measures are used the level of risk is lowered to an acceptable level. Controls include:

- General Laboratory or Workshop induction
- Adequate footwear (must be fully-enclosed, with no toes, heels or tops of feet showing; if working with concentrated acids the footwear should be relatively non-permeable to allow time for removal in case of a spill)
- Use of a lab coat or gown
- Use of fume hood for flammable, toxic, corrosive or noxious materials
- Other PPE (e.g. disposable gloves, face mask) as appropriate for the material & task

When these control methods are used (as they should be in a normal lab situation), no further risk assessment is deemed necessary for Risk Category 3 chemicals. Access to Chemwatch (and knowing how to use it) within 5 minutes is considered to be an acceptable means of retrieving SDS.

2.2 Risk Category 4 and 5 chemicals

Chemicals within Risk Category 4 or 5 are considered to be of moderate to high risk, when no control measures are used. Additional control measures may be required on top of those identified for Risk Category 3 chemicals to lower risk, and must be identified by way of a written risk assessment.

If suitable, a risk assessment may be written to cover a group of chemicals (e.g. dangerous goods class 4.3 *Dangerous When Wet* chemicals). When writing a risk assessment, the manufacturer's SDS or Chemwatch SDS must be consulted.

A printed SDS must be held within the work area for Risk Category 4 or 5 chemicals. It can either be the manufacturer's SDS, Chemwatch SDS or Chemwatch mini-SDS (the latter are colour-coded and provide a one page summary of information that would be required in an emergency). SDS are valid for 5 years from the date they are written, after this period a new SDS must be obtained.

2.3 Risk assessment process

The Faculty's Chemical Risk Assessment_SOP template should be used for completing risk assessments of all chemicals and can be found on the SEBE Health Safety and Wellbeing site.

Chemical Risk Assessment Template sections:

1) General information
2) SDS information – available on the SDS.

For parent or concentrated chemical

3) Risk Category Assessment – Information about hazard phrases and the associated risk category.
4) Preventative Control Measures – directly linked to the hazard phrases listed in Section 3.

If Chemical is identified as a Category 4 or 5, users must also complete:

5) Emergency Response Procedures – Identify exposure routes and how to manage spills.
6) Storage Requirements
7) Waste disposal methods - particularly important if the chemical has an environmental effect (Hazard statement H400-420). For these chemicals refer to the SDS for correct disposal methods, and specify in this section precisely how waste will be disposed of.

Safe working practices

8) Task to be performed – briefly describe how you will be using the chemical ie making a solution
9) Work Practice Instructions – provide step by step instructions on how the chemical will be used

10) Risk Category Assessment if chemical is to be diluted or solution made from a solid.
11) Hierarchy of controls considered
12) Risk rating after procedure – Risk category of working solutions.

2.4 Higher-risk chemicals and SOPs

Chemicals which are deemed to be of the highest risk should have an SOP written detailing the potential hazard, correct safe handling procedures and disposal procedures. SOPs should be minimal in length (1-2 pages) and displayed (or stored) near the work area. They should be used for training, and signed off by workers as a record of their training. Examples of higher risk chemicals that require an SOP are explosives, cyanides, benzene, hydrofluoric acid and osmium tetroxide.

A document library containing SOPs written for various tasks undertaken within the Faculty is available through SEBE Staff - Health Safety and Wellbeing site. It may be useful to check if there is a SOP written for a chemical that you are assessing, and use it as a starting point for your own document.
Contact the Faculty Manager, HSE (Matt Connolly) for advice if writing an SOP.

Section 3- General chemical management

3.1 Chemical registers

A register of all hazardous chemicals (both dangerous goods and hazardous substances) must be maintained in each lab or workshop and should be posted near the entrance. Lists should also be posted on the outside of chemical storage cabinets, fridges, cupboards, etc. of the items held within. Chemical registers are mandatory under OHS regulations and will be requested each year by the OHS Unit to compile a summary to be sent to WorkSafe Victoria.

3.2 Chemical labelling

- Ensure all containers are correctly labelled:
    - Paper labels must be used, do not write on glass with marker
    - Include the full name of the chemical(s) not abbreviations
    - Include GHS or equivalent dangerous goods diamond(s) if appropriate
    - If a solution/mixture has been prepared, include the preparer's name and date of preparation
- All chemical containers must be dated both upon arrival at Deakin and upon opening

3.3 Chemical storage

- Chemicals must be stored safely, so that incompatible materials are stored a minimum of 3m apart if they are not in chemical storage cabinets
- Solids and liquids should be kept separate
- Use trays as secondary containment so that if there is a spill/leak it does not spread too far
- Do not use the base of a chemical storage cabinet to store chemicals. This area is designed to collect spills from within the cabinet. Ensure the bottom shelf is installed.
- Store chemicals below 1.5m
- Do not store flammable substances in fridges -or freezers that have not been modified to be spark-proof

3.4 Limited quantities allowed per area

According to AS/NZS2243.10:2004, there are maximum quantities of chemicals that are permitted in a laboratory other than in a chemical storage cabinet:

Dangerous Goods Class	Maximum per 50m^2 (kg or L)	Maximum pack size (kg or L)
Class 3 primary or sub-risk	10	5
Class 4.1, 4.2, 4.3, 5.1 or 5.2	20 but less than 10 of any one class(1)	10
Class 6.1	Packing Group I= 10; Other= 50	Packing Group I= 10; Other= 50
Class 8	20 for liquids, 50 for solids	20
Hazardous substances		5 for liquids, 20 for solids
Note (1)- for Class 5.1 it is the total amount of active ingredient present		

3.5 Special groups of chemicals

1) **Peroxide-formers:** Chemicals assigned hazard statement AUH019 (or risk phrase R19) may form explosive peroxides so they **must be identified and properly managed**, which includes:

- A system for identifying peroxide-forming chemicals
- Labelling with date of arrival and date of opening
- Testing every 3-6 months for the formation of peroxides (record test results on the chemical container)
- Disposal if: unopened from manufacturer within 18 months; open and testing has not been carried out for 12 months; or open and unlabelled with date of arrival or testing

See the Peroxide forming chemicals information sheet

2) **Hypochlorites:** Chemicals containing hypochlorites (e.g. bleach) will degrade over time so that there is less available chlorine in solution. Hypochlorite solutions **must** be dated upon arrival and either tested for available chlorine every 6 months, or disposed of and new stock used. Mark test results on the chemical container.

3) **Scheduled poisons:** Poisons that are scheduled 4, 7, 8 or 9 must be listed in a Poisons Control Plan and have special storage and use requirements. See the technical manager in your area for more information.

4) **Human carcinogens:** See Deakin carcinogen management guidelines

5) **High-consequence dangerous goods & drug pre-cursors:** See High Consequence Dangerous Goods

Section 4- Ordering and Waste Disposal

4.1 Obtaining chemicals

All hazardous chemicals must be obtained through the purchase order system (not with corporate credit cards). Any chemicals obtained outside of the purchase order system, and brought onto University premises, must be included on all laboratory documentation including any relevant manifests and chemical registers.

Procurement process:

1. Obtain an SDS, and determine the Risk Category based upon the GHS phrases
2. Complete a risk assessment if chemical is in Risk Category 4 or 5
3. Complete a purchase order and forward it along with the SDS to purchasing staff in your work area. Attach the risk assessment if it is a Risk Category 4 or 5 chemical
4. You must include on the purchase order if the chemical is a scheduled 4, 7, 8, or 9 poison

4.2 Waste management

Chemical waste must be treated in the same manner as any other chemical-

- Packaging must be sturdy and sufficient for the material it holds
- Labelling must include the full name of the chemical(s) in the waste
- A dangerous goods diamond must be displayed if applicable
- Do not mix incompatible wastes in a single container
- Dangerous goods classes must be kept separate
- Keep quantities to a minimum in fume-hoods and on work benches. Waste counts in the total amount of chemical that is allowed to be held outside a chemical storage cabinet

All hazardous chemical waste must comply with the waste management guidelines described above. Chemical waste procedures by campus:

Waurn Ponds- Waste can be taken to the LES inwards/outwards goods store (ka2.124) during store operating hours.

Burwood- Waste can be taken to the external chemical stores, clearly-labelled with DG symbol and PG number and the Laboratory Manager notified. The Laboratory Manager will organise annual or biannual clearance of waste through a registered waste disposal company ie Chemsal or

Warrnambool- Chemical wastes will be collected annually (Oct) by Technical Officer for professional disposal. Alternatively contact the Technical Officer for an appropriate storage location until annual disposal.

Section 5- Summary

5.1 Chemical management requirements

1) A **register of all hazardous chemicals** within each work area must be maintained, posted and made available when requested.
2) A printed **SDS must be available** for all hazardous chemicals in Risk Category 4 or 5. All workers must know how to access SDS using Chemwatch.
3) A written **risk assessment** must be completed for all hazardous chemicals in Risk Category 4 or 5.
4) An **SOP** must be completed for the highest risk of chemicals (the list in Section 2.4 is not all-inclusive).
5) All chemicals must be labelled and stored safely and correctly, within limits described in section 3.4.

Appendix 1 – GHS phrases and their associated Risk Categories

Physical Hazard Statements		
AUH001	Explosive when dry	5
AUH006	Explosive with or without contact with air	5
AUH014	Reacts violently with water	4
AUH018	In use, may form flammable/explosive vapour -air mixture	3
AUH019	May form explosive peroxides	4
AUH044	Risk of explosion if heated under confinement	4
H221	Flammable gas	4
H222	Extremely flammable material	4
H223	Flammable material	3
H224	Extremely flammable liquid and vapour	4
H225	Highly flammable liquid and vapour	4
H226	Flammable liquid and vapour	3
H227	Combustible liquid	3
H228	Flammable solid	3
H240	Heating may cause an explosion	5
H241	Heating may cause a fire or explosion	5
H242	Heating may cause a fire	4
H250	Catches fire spontaneously if exposed to air	4
H251	Self-heating; may catch fire	4
H252	Self-heating in large quantities; may catch fire	3
H260	In contact with water releases flammable gases which may ignite spontaneously	4
H261	In contact with water releases flammable gas	4
H270	May cause or intensify fire; oxidizer	3
H271	May cause fire or explosion; strong oxidizer	4
H272	May intensify fire; oxidizer	3
H280	Contains gas under pressure; may explode if heated	3
H281	Contains refrigerated gas; may cause cryogenic burns or injury	3
H290	May be corrosive to metals	3

Environmental Health Hazards		
H400	Very toxic to aquatic life	4
H401	Toxic to aquatic life	3
H402	Harmful to aquatic life	3
H410	Very toxic to aquatic life with long lasting effects	4
H411	Toxic to aquatic life with long lasting effects	3
H412	Harmful to aquatic life with long lasting effects	3
H413	May cause long lasting harmful effects to aquatic life	3
H420	Harms public health and the environment by destroying ozone in the upper atmosphere	3

Health Hazard Statements		
AUH029	Contact with water liberates toxic gas	4
AUH031	Contact with acids liberates toxic gas	4
AUH032	Contact with acids liberates very toxic gas	5
AUH066	Repeated exposure may cause skin dryness or cracking	3
AUH070	Toxic by eye contact	4
AUH071	Corrosive to the respiratory tract	4
H300	Fatal if swallowed	5
H301	Toxic if swallowed	4
H302	Harmful if swallowed	3
H303	May be harmful if swallowed	3
H304	May be fatal if swallowed and enters airways	4
H305	May be harmful if swallowed and enters airways	5
H310	Fatal in contact with skin	5
H311	Toxic in contact with skin	4
H312	Harmful in contact with skin	3
H313	May be harmful in contact with skin	3
H314	Causes severe skin burns and eye damage	4
H315	Causes skin irritation	3
H316	Causes mild skin irritation	3
H317	May cause an allergic skin reaction	3
H318	Causes serious eye damage	4
H319	Causes serious eye irritation	3
H320	Causes eye irritation	3
H330	Fatal if inhaled	5
H331	Toxic if inhaled	4
H332	Harmful if inhaled	3
H333	May be harmful if inhaled	3
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	4
H335	May cause respiratory irritation	3
H336	May cause drowsiness or dizziness	3
H340	May cause genetic defects	5
H341	Suspected of causing genetic defects	4
H350	May cause cancer	5
H351	Suspected of causing cancer	4
H360	May damage fertility or the unborn child	5
H361	Suspected of damaging fertility or the unborn child	4
H362	May cause harm to breast-fed children	5
H370	Causes damage to organs	4
H371	May cause damage to organs	3
H372	Causes damage to organs through prolonged or repeated exposure	4
H373	May cause damage to organs through prolonged or repeated exposure	3