



# Environmental Management

## Training Guide: Green Laboratory Compliance

Never Stand Still

Sustainability

## Unit 2

# Chemicals Management

Designed to inform staff and students working in UNSW laboratories of the chemicals management and relevant environmental compliance risks and responsibilities associated with their work.



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**Disclaimer**

The UNSW Sustainability Office has prepared this guide for UNSW staff and researchers as part of the Green Lab Environmental Compliance Induction Training. This guide is not designed or aimed at general public. It is not intended to be an exhaustive guide to preventing pollution nor does it constitute legal or regulatory advice. Organisations and individuals should seek their own legal and other expert advice concerning environmental compliance requirements and storage and handling of chemicals. UNSW, its officers, employees, contractors, successors and assigns make no warranties or guarantees, expressed or implied, assume no responsibility or liability of any kind, and specifically disclaim responsibility for any liability, loss, injury or risk which is incurred as a direct or indirect result of the use of any of the material or services included in or omitted from this document.

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**Version control**

UNSW Sustainability Green Lab program management will update the information in this document from time to time. Users should ensure they have the most recent version.

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**Table of contents**

<b>UNIT 2: CHEMICALS MANAGEMENT</b>	<b>4</b>
LEARNING OUTCOMES	5
<b>1 MANDATORY COMPLIANCE</b>	<b>6</b>
1.1 STORAGE	6
1.2 HANDLING AND DISPOSAL	7
1.3 EXERCISE 1: MANDATORY COMPLIANCE	10
1.4 KEY LEARNING POINTS	10
<b>2 BEST PRACTICE</b>	<b>11</b>
2.1 STORAGE	11
2.2 HANDLING AND DISPOSAL	12
2.3 EXERCISE 2: BEST PRACTICE	15
2.4 KEY LEARNING POINTS	15
<b>3 ASSESSMENT:</b>	<b>16</b>
3.1 ASSESSMENT	16
<b>4 USEFUL REFERENCES AND WEBSITES</b>	<b>16</b>
<b>5 REFERENCES</b>	<b>17</b>
<b>6 APPENDIX</b>	<b>18</b>
6.1 RELEVANT STANDARDS	18
6.2 UNSW POLICIES, GUIDELINES AND PROCEDURES	18
LEGAL DISCLAIMER	19

## Unit 2: Chemicals Management

This chemicals management unit of the Green Lab Environmental Compliance Training is targeted at environmental accountability and penalties relevant to chemicals management in laboratories (including storage, handling and disposal). Also it outlines strategies for reducing chemical use, green chemistry methodologies and relevant hazardous waste minimization strategies. Almost every laboratory user is expected to attempt this specific unit because chemicals are the most common aspect of laboratory practices and can have very serious impacts on natural environment.

Learners should notionally allow 30 minutes for completion of this unit, including self assessment activities and the quiz. Pass mark for this specific unit is 80%.

An overview of the components of the training program and your current position in successfully completing this training is provided in the diagram below.

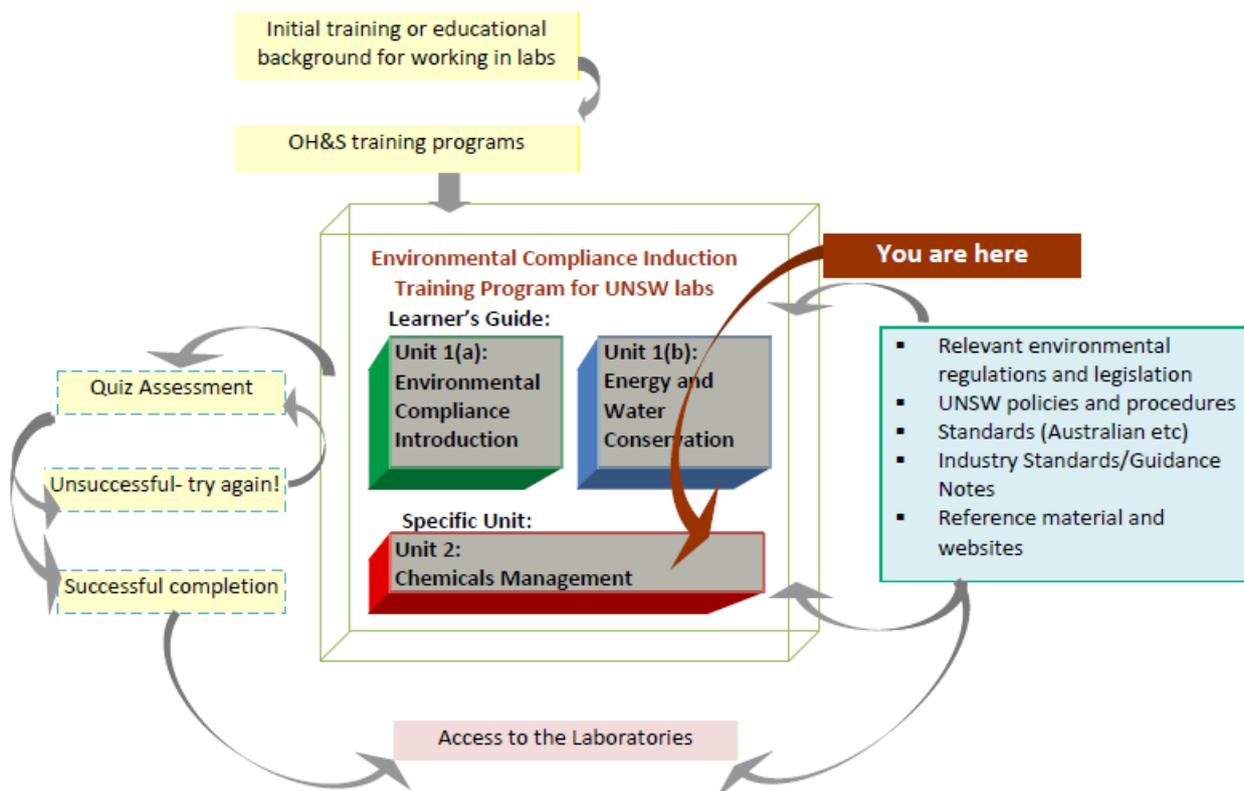


Fig 1: Compliance Induction Training Program – An Overview

## Learning Outcomes



### Learning outcomes: Chemicals Management

After completing this unit you should be able to:

- Identify and document legal requirements that must be adhered to in relevant environmental laws and regulations in relation to chemicals management in laboratories (i.e. storage, handling and disposal).
- Identify relevant Australian Standards and other guidelines or Standards that are prescribed in environmental laws and regulations relevant to chemicals management in laboratories.
- Identify relevant UNSW policies and procedures and document requirements for compliance in relation to chemicals management in laboratories.
- Identify strategies for reducing chemical use, green chemistry methodologies and relevant hazardous waste minimization strategies for your laboratory.

## 1 Mandatory Compliance

Compliance with relevant laws and regulations is the basic concern for all facilities dealing with dangerous goods and hazardous chemicals. Under the *Protection of the Environment Operations Act, individuals face personal fines of up to \$1M, and corporations face fines of up to \$5M* for breaches of requirements specified in the act. These fundamental requirements are documented in the Compulsory Introduction learner's guide. UNSW has corporate compliance responsibilities, but laboratory users (staff, researchers and managers) also have direct legal personal accountability for awareness of and compliance with the law. Heads of School, laboratory managers and laboratory staff must address and actively support compliance with relevant laws and regulations to avoid incurring personal liability.

This section outlines environmental compliance requirements relevant to chemicals management in UNSW laboratories. Mandatory compliance issues are directly dictated by law and must be cautiously managed to avoid risk of penalties (fines and/or imprisonment) as discussed in the introductory unit.

### 1.1 Storage

To avoid possible penalties laboratory staff and students must make sure that the following mandatory compliance requirements are fulfilled:

- Leaks, spillage and other escapes of any substance (e.g. Hazardous Chemicals) to the environment in a manner that harms or is likely to harm the environment is considered as Tier 1 offence (fines up to \$5M for corporations and \$1M for individuals) under the Protection of Environment Operations Act (SECT 116). A person who causes, or contributes to this situation (wilfully or negligently) is considered liable. It is vital for laboratory managers and all others responsible to establish and implement effective measures for preventing any such incident (e.g. emergency plan, spill containment, spill procedures, spill kits, emergency training).
- All laboratories storing and dealing with chemicals should have proper signage and placarding (HAZCHEM sign on all main entrances, placarding for bulk containers including UN number and displaying DG Class symbol for premises where the DG class exceeds manifest quantities)<sup>1</sup>.
- Under the "Environmentally Hazardous Chemicals Act 1985" if an organisation uses, disposes or stores chemicals onsite with potential danger to the environment or disposes of chemicals in a way that can harm the environment and has no licence for the premises they are likely to be charged with a maximum penalty of \$137,500 for a corporation and \$66,000 for an individual. It is critical for laboratory managers, users and all other relevant authorities to make sure that all applicable licences are attained and all UNSW policies, procedures and guidelines for storage of chemicals are strictly followed.
- Certain chemicals have specific storage and safety requirements because of their possible adverse impact on humans and the wider environment. Such chemicals as Class 5.1 oxidising substances, Class 5.2 Organic peroxides, Class 6 toxics, Class 4 flammable solids and Class 8 corrosives require Work Cover licences for storing in

**What is "material harm to environment"???**

According to Protection of the Environment Operations Act material harm is:

- (1) Actual or potential harm to the health or safety of human beings or to ecosystems that is not trivial,  
OR
- (2) Actual or potential loss or property damage amounting to \$10,000, including on your own premises.

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<sup>1</sup> AS/NZS 2982.1:1997 Laboratory design and construction

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## UNIT 2: CHEMICALS MANAGEMENT

quantities above a certain level. All laboratory users should be aware of the licensing and management requirements of such chemicals<sup>2</sup>.

- All laboratories storing any of the prohibited carcinogens<sup>3</sup> should have a Work Cover licence for it.
- A supplier's MSDS's must be available for each chemical used in the laboratory and it should not be older than 5 years (requirement of the Occupational Health and Safety Reg 2001).
- All chemicals must be stored according to their compatibilities, in appropriate containers, in suitable storage areas (locked cabinets, shelves, fridge etc) and in an appropriate manner (dry, wet, in oil etc). These measures are essential to avoid accidental leakage, spills and escapes with potential harm to the environment. (Protection of the Environment Operations Act).
- All gas cylinders should be labelled, stored upright, properly shielded, colour coded and tested by the relevant authority at intervals recommended by OH&S DG regulations and Australian Standards (AS/NZS 2243.10: 2004 Safety in Laboratories Part 10: Storage of Chemicals).
- All Liquefied Flammable Gas Cylinders should be stored upright with safety relief device in contact with the vapour and not with the liquid (Air pollution Section 126, Protection of the Environment Operations Act).

### 1.2 Handling and Disposal

There are many regulatory requirements for safe handling and disposal of hazardous chemicals. To avoid incurring personal liability, all laboratory users must address and actively support compliance with these laws and regulations.

- Under the Protection of the Environment Operations Act, any harm to the environment or act of pollution (of water or air) wilful or negligent, is a serious offence. All laboratory users identified in the "UNSW Policy on Responsibility and Accountability in relation to Environmental Law" must ensure compliance with UNSW hazardous chemicals handling and disposal procedures and guidelines. All these procedures are derived from mandatory compliance sources.
- Hazard and/or risk identification and reporting plays a vital role in environmental management. On identification of a potential hazard or risk to the environment inform your manager or lab supervisor immediately. Log a hazard/incident report through H2O Online Environmental and OHS reporting system available through [MyUNSW](#). In case of an emergency call security at **x56666**.
- All lab users are under legal obligation to report all pollution incidents to the authorities.
  - Call **Emergency** at **x56666** (external 9385 6666) immediately and inform your lab supervisor or manager.
  - In case of a major incident involving chemical spill, chemical pollution event or a possible misuse of a chemical, report the incident at NSW Government's 24-hour [Environment line](#) (Phone: 131555).
- Pollution of any waters is a Tier 2 offence under the Protection of the Environment Operations Act (with fines up to \$250,000 for individuals). To ensure compliance with environmental laws and the "Sydney Water Waste Trade Agreement," UNSW has a



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<sup>2</sup> For complete information on these Classes go to the [Chemicals Safety policies, procedures and guidelines](#).

<sup>3</sup> For a list of prohibited and notifiable carcinogens please consult [UNSW procedure for prohibited carcinogens](#)

## UNIT 2: CHEMICALS MANAGEMENT

policy of “No chemicals down the drain<sup>4</sup>” which is applicable to all laboratories on campus. All laboratory users must comply with this and other waste management strategies.

- No chemicals or waste materials should be allowed to reach the storm water ways. All storm water drains must be clearly labelled near the chemical storage areas and all lab users should be aware of the location of storm water drains.
- To avoid spills, and discharge to waterways, all floor drains<sup>5</sup> in the laboratory area should be covered.
- Using proper personal protective equipment and clothing while working in laboratories is not just important for OH&S reasons but is also vital for avoiding accidents which can result in harm to the environment.
- Wilful or negligent disposal of any waste in a manner that harms or is likely to harm the environment is a Tier 1 offence under the Protection of the Environment Operations Act (penalties of up to \$5M for corporations and \$1M for individuals). All hazardous chemical waste must be disposed according to the “[UNSW hazardous waste procedures](#)”.
- All specialized requirements for handling and disposing the chemicals from Classes 4 flammable solids, 5.1 oxidising substances, 5.2 organic peroxides, 6 toxics and 8 corrosives must be followed.
- It is mandatory under the NSW Waste Avoidance and Resource Recovery Act 2001 (fines of up to \$22,000 for individuals and \$44,000 for cooperation for not complying), to put in place procedures for reducing hazardous waste production.
- Under the Protection of the Environment Operations Act Section 126, air pollution is a Tier 2 offence. To avoid penalties under this act, laboratory managers must make sure that all laboratory contaminants emitted to the outside atmosphere (through stacks, vents and exhausts) are not harmful to the environment, and all the relevant documents and permits are maintained.
- A comprehensive risk assessment based on the identification of hazard and risk to the environment should be completed before initiating any work on Dangerous Goods (with particular attention paid to hazardous chemicals from 5.1, 5.2, 6, 4, and 8 Classes). In the case of a spill or accidental discharge of hazardous chemicals, risk identification, assessment and elimination can prove critical for avoiding liabilities under the Protection of the Environment Operations Act.
- All laboratory personnel and students must have access to and must use supplier provided MSDS’s for information on chemical use and in case of emergency.
- To avoid accidents, all chemicals especially decanted liquids, must be labelled completely and appropriately.
- It is mandatory to have a suitable spill kit available to deal with a spill of any class of hazardous chemicals stored or handled in the laboratory.

**No Chemicals down the Drains (to sewer or storm water system):**

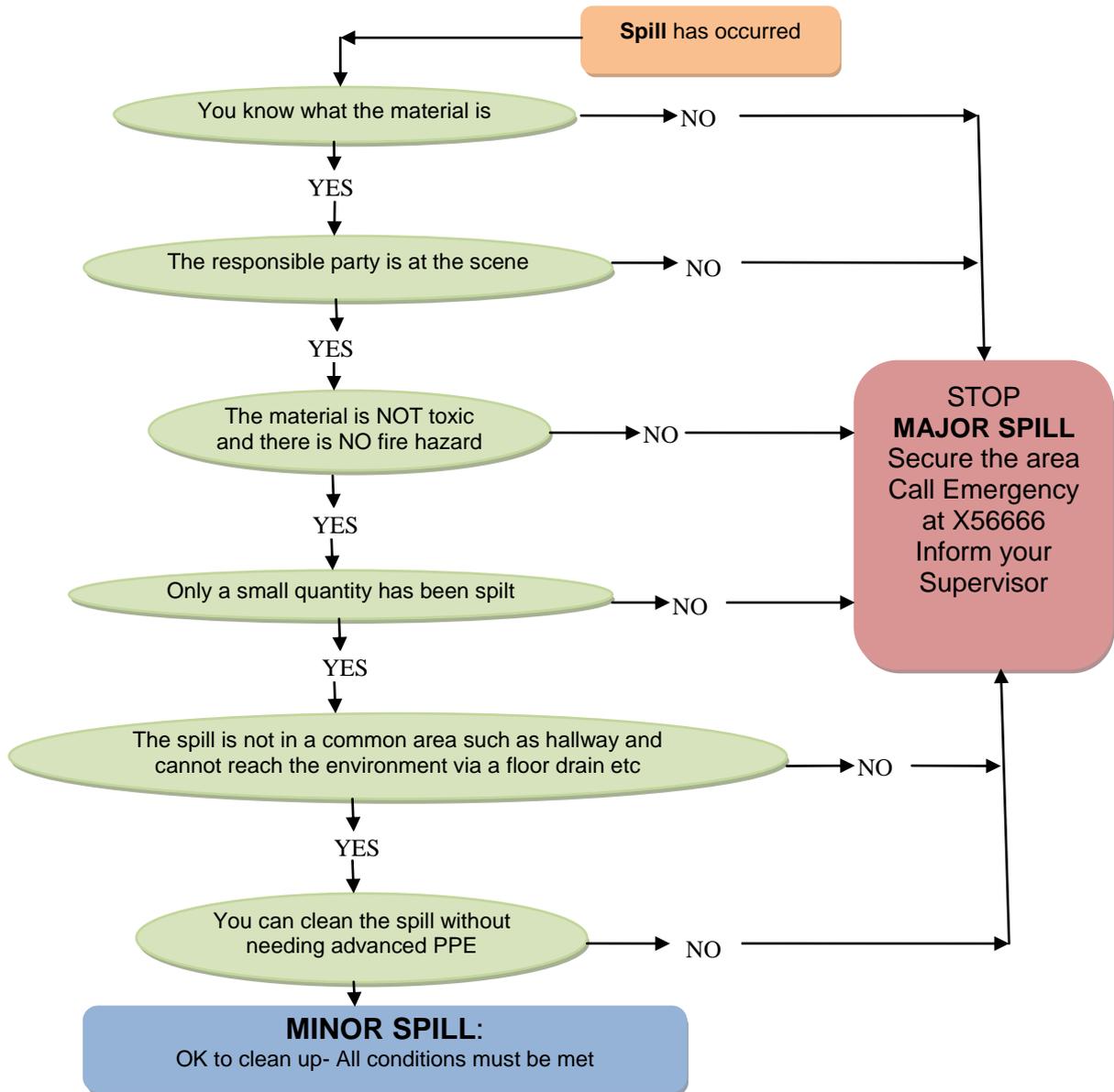
- Pollution of any waters is a Tier 2 offence under Protection of Environment Operations Act
- It is a requirement under the “Sydney Water Waste Trade Agreement,”
- It is UNSW policy &

**YES! BLEACH IS A CHEMICAL**

<sup>4</sup> Drains to sewer or storm water system

<sup>5</sup> As above

- Chemical spill action flow diagram adopted from **MIT Environment Health and Safety** website. Available at <http://ehs.mit.edu/site/content/chemical-spills>





### **Exercise 1: Mandatory Compliance**

Take 2 minutes to find correct answers for these questions. You should be able to find relevant information in the above section.

- What is the maximum individual penalty under the Environmentally Hazardous Chemicals Act 1985 for disposing or storing chemicals without licence?
- Is it mandatory to inform relevant authorities of a pollution incident that has harmed or can harm the environment?



### **Key Learning Points**

Good work! You have completed the section about compliance framework and requirements for working in labs at UNSW. You should now have an understanding of how to:

- Avoid spills and leakage of chemicals.
- Follow procedure to avoid accidents and emergency situations which could result in harm to property and the environment.
- Store chemicals according to their respective compatibilities and safety requirements.
- Label all chemical containers (storage, decanted chemicals, and waste containers).
- Deal with all spills immediately and report all accidents no matter how small.

## 2 Best Practice

The following best practice guidelines are derived from relevant Codes, Australian Standards and UNSW policies and procedures. All these guidance materials are derived from mandatory compliance sources. Should an incident or breach occur, the strongest defence against potential personal liability is demonstrable compliance with UNSW guidelines, procedures, relevant Codes and Australian Standards.

A list of relevant Standards and UNSW policies and procedures is provided in Appendix 7.

### 2.1 Storage

- According to the UNSW Hazardous Substances Program proper labelling of any containers holding hazardous chemicals (including decanted chemicals and waste) is compulsory. This label should at least include the complete name of the chemical (both chemical and common), date and risk phrases (Hazardous Substances Program, AS/NZS 2243.10: 2004 Safety in Laboratories Part 10: Storage of Chemicals).
- If you identify an unlabeled container with an unknown liquid chemical in it. You must treat it like any hazardous chemical and inform your lab supervisor or manager immediately.
- All UNSW laboratories should have an up-dated Chemicals Register, with details of stored chemicals. A centralized system for tracking and record keeping of all chemicals ordered and used in schools is more efficient for resource recovery and hazardous waste reduction.
- The amount of chemicals stored in laboratories should be minimized to avoid any major pollution incident. Some of the methods to avoid major build up of chemicals in laboratories are: nominating the owner of the chemical, sharing chemical, keeping records of chemicals use, maintaining purchasing records, keeping up to date chemicals registers, and immediate disposal of unwanted hazardous chemicals.
- All hazardous chemicals/Dangerous Goods should be stored in suitable undamaged containers and in suitable safe storage areas according to the instructions in MSDS's and [UNSW Storage of Dangerous Goods Guidelines](#).
- All liquid oxygen or nitrogen cylinders should be stored in approved places with multilingual notices(s).
- All chemicals should be stored off the floor at all times.
- Chemical containers should be securely closed at all times except when in use.
- All flammable cabinets should be at least 3 metres away from exits or emergency doors.
- All chemicals should be stored compatibly on shelves away from direct sunlight and heat sources.
- All water reactive chemicals should be stored away from sources of water (sinks/pipes/emergency shower etc).
- Highly toxic chemicals should be stored in secondary containers to retain any leaked material.
- All incompatibles should be stored separately, e.g. Class 8 organic and inorganic corrosives.
- Special care should be taken in storing explosives e.g. formic acid and picric acid.

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## UNIT 2: CHEMICALS MANAGEMENT

- Chemical storage fridges and cabinets should have a complete inventory of the stored substances on the door. This inventory should have details of the substance, owner, amount and the date of entry for every chemical.

### 2.2 Handling and Disposal

- To ensure compliance<sup>6</sup> and to demonstrate due diligence, the following waste minimization strategies should be adopted in all UNSW laboratories dealing with hazardous chemicals. These strategies are directly derived from the relevant Codes, Australian Standards and UNSW policies and procedures.
  - Possible environmental impacts of any work in a laboratory should be assessed before starting experiments, preferably at the point of experimental design.
  - Experiments should be engineered in such a way that the smallest possible amount of chemicals is required.
  - Only minimal amounts of chemicals that give rise to intractable waste should be used, especially those containing heavy metals. These chemicals cannot be disposed into the environment, and are very expensive to store.
  - Only the smallest possible quantities of chemicals required for current need should be ordered. Storing chemicals for possible future use gives rise to risk, and is not recommended.
  - The use of highly toxic, reactive, carcinogenic or mutagenic materials should be reviewed to determine if safer alternatives can be used.
  - Surplus chemicals should be checked before ordering new chemicals.
  - Expired chemicals should not be stored. All expired and unwanted chemicals (especially toxic and unstable chemicals) should be tracked and properly disposed of.
  - All waste types should be segregated, stored and disposed of according to the [UNSW Laboratory Hazardous Waste Disposal Procedure](#): Halogenated from non halogenated, organic from inorganic or metal containing, chemical waste from normal trash, and hazardous chemicals from non hazardous, toxic waste from all others.
  - Purchase policies should be designed to reduce environmental risk. E.g. switching to less toxic alternatives for chemicals used in labs, and avoiding explosives.
  - Environment Health and Safety unit of MIT has created a [Green Chemical Alternative Purchasing Wizard](#)<sup>7</sup> to assist lab users around the world in selecting green chemical alternatives for their procedures. All lab users should use this wizard and consider green alternatives before purchasing new chemicals.
  - Ordering of chemicals should preferably be centralized through one person in the school to simplify management.
  - The possibility of sharing by-products of different laboratories should be assessed, e.g. using research by-products for exercises in teaching laboratories and vice versa.
  - The possibility of redistillation of solvents in laboratories should be evaluated.

#### [Green Chemical Alternatives Purchasing Wizard](#)

Online tool designed by EHS unit of MIT is available to assist lab users around the world in selecting Greener alternatives for their procedures.

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<sup>6</sup> with the NSW POEO Act 1997, NSW Waste Avoidance and Resource Recovery Act 1985, Australian Standards, and UNSW policies

<sup>7</sup> EHS.MIT.EDU available at <http://ehs.mit.edu/site/content/green-chemical-alternatives-purchasing-wizard>

## UNIT 2: CHEMICALS MANAGEMENT

- Chemical containers should be dated when first received so that older ones will be used first to reduce loss of chemicals through exceeding their expiry date.
- A complete inventory of chemicals should be kept in laboratories and it should be updated when chemicals are purchased or used.
- Never accept donations of chemicals unless they are clearly and adequately labelled and you have plans for using them within 12 months.
- Quickly respond to any spill or accident. Stop your work and contain the spill immediately. Depending on the nature of the spill (see flow chart fig 2, sect 1.2) report supervisor or manager first and then cleanup or vis-versa. Immediate and efficient action can considerably reduce the potential for a discharge to the environment as well as the cost of clean-up.
- In case of a major chemical spill inform others around, call emergency at **x56666**, inform your supervisor or manager immediately, and try to contain the spill if safe for you and prepare for evacuation if required (See section 1.2 flow chart for a clear identification of minor and major spill).
- Storage of chemical waste in the laboratory should be minimized. Facilities Management coordinate the disposal of all hazardous and contaminated wastes. Requests for waste pick-up should be made on the appropriate Biological, Chemical or Radiation waste forms which are available from [www.ohs.unsw.edu.au/ohs\\_waste/index.html](http://www.ohs.unsw.edu.au/ohs_waste/index.html).
- If you have enquires about collection/missed pickups for BIOLOGICAL & CHEMICAL waste please phone FM Assist on 93855111 or email [fmgeneralservices@unsw.edu.au](mailto:fmgeneralservices@unsw.edu.au).
- Waste management and pollution prevention should be included in the pre- and post-laboratory sections of course materials for students.
- Storage containers should be used with secondary containment (e.g. drip trays, absorbent paper, and a barrier around loading/unloading areas).
- Waste detoxification and/or waste neutralization should be considered as a final step in laboratory experiments and student exercises.
- When preparing a new procedure or protocol, the types and quantities of waste products should be evaluated, and possible methods to reduce or eliminate waste should be considered.
- Air space of at least 20% should be left in bottles of liquid waste to allow for vapour expansion, and to reduce the potential for spills to occur when moving overfilled containers.
- The least resource consuming and polluting methods should be used for cleaning glassware.
- According to the [UNSW Disposal of Hazardous Waste](#) Policy, containers with hazardous chemical waste should be clearly labelled as “Hazardous Waste”. The label should also contain details of the waste generator and the contents of the container.
- To contain any major spill a plan for emergency preparedness and response should be in place and all laboratory users should be well aware of this plan and procedures.
- To avoid accidents and air pollution while working in a fume cupboard always:

Under the Protection of the Environment Operations Act sect 91, If the person given a **clean-up notice** by EPA complies with the notice but was not the person who caused the pollution incident, the cost of complying with the notice may be recovered by the person who complied with the notice as a debt in a court of competent jurisdiction from the person **who caused the pollution incident**.

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## UNIT 2: CHEMICALS MANAGEMENT

- Use reduced quantities of reagents
- Use a slower reaction rate while working in a fume cabinet
- Always seal containers of reagents to prevent evaporation or accidental spillage when not in use.
- Ensure that fume cupboard is emptied of apparatus and materials, and is thoroughly cleaned before turning off the fan.
- Cylinders of compressed gas should be listed on the chemical inventory, should be positioned in such a way that the contents label is visible, and stored in a dry, well-ventilated location that is protected from heat sources.
- Flash back arresters should be fixed on flammable gas cylinders.
- All mercury compounds and mercury-containing devices should be identified and substituted with alternatives that pose a lower environmental risk.
- The build up of chemical waste in laboratories should be avoided by ensuring chemical waste is regularly removed from the premises.
- All hazardous waste should be properly sealed and labelled according to the [UNSW Procedures](#), ensuring no potential for leakage or damage. Label requires: Waste category, specific hazard information, emergency information, waste generator, building and room number.



### **Exercise 2: Best Practice**

Take 2 minutes to find correct answers for these questions. You should be able to find relevant information in the above section.

- What information is compulsory for inventories on the doors of chemical storage fridges and cabinets?
- Name a few methods for minimizing the storage of chemicals in laboratories.
- According to the UNSW Hazardous Substances Program, what information is required on a chemical container label?
- Who coordinates the disposal of Hazardous Waste at UNSW?



### **Key Learning Points**

Good work! You have completed the section about compliance framework and requirements for working in labs at UNSW. You should now have an understanding of how and why to:

- Label all chemical storage and waste containers.
- Follow all UNSW procedures and guidelines for safe storage, handling and disposal of chemicals.
- Adopt hazardous waste minimization strategies.
- Deal with spills immediately and properly.
- Follow UNSW procedures for safe storage of gas cylinders in laboratories.

### 3 Assessment:



#### **Assessment**

You have completed the chemicals management unit. Please attempt the quiz assessment.

- Click on the assessment link from the menu on left side of your screen. Please read guidelines before attempting.
- It is a quiz assessment with ten multiple choice questions chosen from a random pool. You have unlimited access to the quiz but you cannot save and go back to an incomplete attempt. In every new attempt you have to start a new quiz. Pass mark for unit 2 is 80%.
- After successful completion of this assessment your records will automatically update on MyUNSW.
- If you are not required to complete unit 2, please contact GL administrator of your school for exemption.
- For any further assistance or inquiries please go to the “frequently asked questions” link in the module or contact the "green lab training administrator" of your school or faculty or go to the Green Lab web site at [www.greenlab.unsw.edu.au](http://www.greenlab.unsw.edu.au) .

### 4 Useful References and Websites

The following web links and documents are highly useful for laboratory users at UNSW. It is recommended that you take a few minutes to explore these links and documents.

- [Policy@UNSW](#): links and information related to latest UNSW policies Environmental Compliance Register for UNSW Laboratories<sup>8</sup>
- [Laws and regulations](#): NSW laws and regulations link
- [OHS forms and checklists](#): UNSW OHS procedures, forms, checklists etc.
- [Incident and hazard reporting](#): Reporting procedures and forms
- [Waste](#): Laboratory hazardous waste disposal procedures and forms.
- [Green Chemical Alternatives Purchasing Wizard](#)

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<sup>8</sup>A copy of ‘Environmental Compliance Register for UNSW laboratories’ is available in the ‘key resources’ organiser link, present with other unit links on the training program main page.

## 5 References

- Australian Golf Course Superintendents Association (AGSCA) (2004), "Australian Turf Grass Management Magazine, Volume 5.6 Dec-Jan 2004"
- Australian Standard HB 206 (2004), "Handbook: Initial environmental review", Standards Australia International, Sydney
- Department of Environment and Conservation (2005a), "Environmental compliance report: Liquid chemical storage, handling and spill management", Part A. Compliance Audit, available at:  
<http://www.environment.nsw.gov.au/resources/licensing/ecrchemicalsa05589.pdf>  
Accessed January 18, 2009
- Department of Environment and Conservation (2005b), "Environmental compliance report: Liquid chemical storage, handling and spill management", Part B. Review of Best Practice and Regulation, available at:  
<http://www.environment.nsw.gov.au/resources/licensing/ecrchemicalsb05590.pdf>  
Accessed January 18, 2009
- Department of Environment and Conservation (2008), "Storing and handling liquids: Trainer's manual", available at: <http://www.environment.nsw.gov.au/sustainbus/liquids.htm>  
Accessed February 12, 2009
- Labs21 (2005), available at: <http://www.labs21century.gov/index.htm> Accessed January 06, 2009
- Massachusetts Institute of Technology (2010), "Environment. Health & Safety: Environmental Stewardship", available at: <http://ehs.mit.edu/site/stewardship> Accessed September 07, 2010
- Massachusetts Institute of Technology (2010), "Green Chemical Alternatives Purchasing Wizard", available at <http://ehs.mit.edu/site/content/green-chemical-alternatives-purchasing-wizard> Accessed September 07, 2010
- Risk and Reliability Associates (R2A) (2004), "Risk and Reliability- an Introductory Text", available at: [http://www.r2a.com.au/publications/5th\\_Edition/16\\_ohs.html](http://www.r2a.com.au/publications/5th_Edition/16_ohs.html) Accessed Nov 5, 2007
- The University of Melbourne (2003), "Comprehensive Green Laboratory Guidelines", Sustainable Laboratory Program, available at:  
[http://www.pb.unimelb.edu.au/ehs/ehs/environmenprogram/green\\_lab/criteria.doc](http://www.pb.unimelb.edu.au/ehs/ehs/environmenprogram/green_lab/criteria.doc)  
Accessed February 12, 2009
- University of Wyoming (2004), "Waste minimization and pollution prevention: laboratory waste minimization program", available at: <http://www.uwyo.edu/safety/ehs/wastemin/index.asp>  
Accessed January 25, 2009
- Woolliams, J., Lloyd, M., and Spengler, D J. (2005), "The case for sustainable laboratories: first steps at Harvard University", International Journal of Sustainability in Higher Education, Vol. 6 No. 4, pp. 363-382

## 6 Appendix

### 6.1 *Relevant Standards*

- AS/NZS 2243 Safety in laboratories
- AS 1940: 2004 The Storage and Handling of Flammable and Combustible Liquids.
- AS/NZS 2243.1: 2005 Safety in Laboratories Part 1: Planning and operational aspects
- AS/NZS 2243.10: 2004 Safety in Laboratories Part 10: Storage of Chemicals
- AS/NZS 2243.2: 2006 Safety in Laboratories Part 2: Chemical Aspects
- AS/NZS 4452: 1997 The Storage and handling of Toxic Substances
- HB 9 Occupational Personal Protection
- National Code of Practice for the control of workplace hazardous substances [NOHSC:2007(1994)]

### 6.2 *UNSW policies, guidelines and procedures*

UNSW Accountability documents:

- UNSW Accountability Framework
- UNSW Compliance Register
- [UNSW Register of Delegations](#)
- [Responsibility, Authority and Accountability Procedure](#)

Lab procedures and guidelines:

- [Carcinogens Guideline](#)
- [Chemical Spills Guideline](#)
- [Guidelines for the Storage of Dangerous Goods at UNSW \(2002\)](#)
- [Hazardous Substances Policy \(2000\)](#)
- [Hazardous Substances Program \(2000\)](#)
- [Labelling of Hazardous Substances Guideline](#)
- [Laboratory Safety Guideline](#)
- [Personal Protective Clothing and Equipment \(PPCE\) Guideline](#)
- [Procedure for Disposal of Hazardous Waste \(2003\)](#)
- [Prohibited and Notifiable Carcinogens Procedure](#)
- [Risk Assessment and Control Procedure](#)
- [Schedule 8 Drugs Procedure](#)
- [UNSW Hazardous Substances and Dangerous Goods procedure](#)

### ***Legal Disclaimer***

This package assumes that learners have already completed the relevant OHS training courses conducted by the OHS and Workers Compensation unit in UNSW Human Resources [http://www.hr.unsw.edu.au/ohswc/ohswc\\_home.html](http://www.hr.unsw.edu.au/ohswc/ohswc_home.html)

This induction training program has been developed by UNSW Sustainability. It directly complements UNSW OH&S training and avoids unnecessary duplication of information already addressed in relevant UNSW OH&S training courses.

This module exclusively addresses additional requirements for compliance with environmental aspects of directly relevant acts and regulations that apply in NSW at time of writing. The information contained in this document is essentially general and incomplete in nature and is not advice that can be directly applied to any specific situation or context without reference to additional, site specific information.

No person should act exclusively on the basis of content of this guide. Readers are recommended to act with additional consideration of the particular site arrangements and circumstances; with direct reference to the details of relevant Acts, regulations, organisational policies and procedures; and where relevant with appropriate professional advice. The content is for information only and should not be considered as comprehensive nor specific advice, warranty or recommendation to any individual person or situation.

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