Guideline for managing risks with chemicals in DoE workplaces

Queensland Government

Table of contents

Chapter 1: managing occupational risks with chemicals

1 Introduction

The purpose of this *Managing occupational risks with chemicals guideline* is to:

- assist departmental staff to adopt safe practices for the management of all chemicals in Department of Education (DoE) workplaces; and
- prevent or minimise the risk of injury or illness to staff, students and others (such as visitors and volunteers) from exposure to chemicals, particularly hazardous substances and dangerous goods.

1.1 Chemicals, hazardous chemicals and dangerous goods – what are they?

Chemical is a general term that includes substances, products and preparations composed of elements, compounds or mixtures. Chemicals may exist as solids, liquid or gases. Chemicals may be classed as hazardous or non-hazardous, or as dangerous goods depending on their potential to cause harm to workers, the environment or property. For clarity and ease, the word *chemical* will be used hereon to refer to all substances, whether they are hazardous, non-hazardous or a dangerous good.

What are hazardous chemicals? A **hazardous chemical** is a substance, mixture or article that satisfies the criteria for a hazard class within either:

- the AC Classification system (the NOHSC approved criteria); or
- as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code 7).

Hazardous chemicals are classified only on the basis of **health** effects. These may be immediate (acute) or long-term (chronic). Because of the way chemicals are classified, many hazardous substances may also be classed as dangerous goods.

Hazardous chemical classes are listed in Schedule 11 of the *Work Health and Safety Regulation 2011*. A chemical's hazardous nature is identified on its label and safety data sheet.

There are many hazardous chemicals utilised in DoE workplaces which have the potential to cause adverse health effects (e.g. acute severe poisoning, asthma, skin rashes and allergy). These chemicals are used for a variety of applications and across a range of work and curriculum areas. It is very important to use all chemicals properly and safely to prevent any negative health effects through exposure.

What are non-hazardous chemicals? Chemicals that are not classified as hazardous chemicals are referred to as **non-hazardous chemicals**. Non-hazardous chemicals generally do not represent a threat to the health and safety of employees and others provided that they are used for their intended purpose and in the way they are supposed to be used. Nevertheless, there is still a requirement for the safe management of non-hazardous chemicals in the workplace under the *WHS Regulation 2011.*

What are dangerous goods? Dangerous goods describe certain substances, mixtures or articles that present a risk during transport, either through their physical and chemical (physicochemical) hazards, acute toxicity or hazards to the environment. They are classified on the basis of immediate physical or chemical risk and usually present an immediate hazard to people, property or the environment due to the possibility of fire, explosion, chemical reaction or release of toxic, flammable or corrosive chemicals during storage or handling.

1.2 Legislative requirements

Departmental workplaces have the responsibility to safely manage the use of **all chemicals**. However, extra vigilance must be exercised when managing hazardous chemicals. The legislation imposes responsibilities on certain persons in a departmental workplace irrespective of the quantities and types of chemicals that may be used. Effective management can be achieved by meeting all relevant legislative requirements.

The *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2011* state the broad legislative duties related to chemical management. Under the Act and Regulations:

- chemicals are now classified as hazardous chemicals in line with the *Globally Harmonised System for Classification and Labelling of Chemicals 4th Revised Edition* (GHS).
- The Dangerous Goods Safety Management Act 2001 has been repealed and is now covered in the WHS Regulation 2011 - Chapter 7. **Dangerous goods classifications** now apply to the transport, segregation and placarding of chemicals only.

Further information:

- Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013
- How to Manage Work Health and Safety Risks Code of Practice 2011

Other useful resources can be found at the end of this document.

1.2.1 Management responsibilities

Departmental supervisors and managers have duties to ensure that the health and safety of themselves, their staff and any other persons (such as students and volunteers) is not affected by the use of hazardous chemicals in the workplace. The specific requirements for the supervisor/manager to discharge their relevant responsibilities for hazardous chemical management are outlined and referenced below:

Management responsibilities	Reference
• Obtaining, recording, and making available safety data sheets (SDS) to all workers prior to the use of a substance and keeping the SDS close to where the substance is being used.	Chapter 2
• Ensuring that all containers housing hazardous chemicals are appropriately labelled with relevant safety information.	Chapter 4
• Ensuring risk assessments are completed and recorded for all hazardous chemicals to effectively manage occupational risks associated with chemicals.	Chapter 5 App 5a
• Implementing appropriate control measures to control exposure to hazardous chemicals; and review and if necessary revise control measures.	Chapter 3
• Provide and maintain safety equipment or personal protective equipment that is suitable for use with hazardous chemicals.	Chapter 4
• Keeping and maintaining a register and manifest (where relevant) of hazardous chemicals and providing notification to the regulator of manifest quantities. • Keeping and maintaining records for all aspects of managing hazardous chemicals.	Chapter 3 App 3a
• Providing adequate supervision, information, instruction and training about hazardous. Chemicals for all users that may be exposed to hazardous chemicals in the workplace.	Chapter 2
• Ensuring emergency plans are prepared for dealing with hazards likely to arise from significant incidents.	Chapter 7
• Prevent access by unauthorised persons to hazardous chemicals stored, or handled at the workplace storage areas.	Chapter 4
• Providing appropriate hazardous atmosphere and health monitoring when required.	App 2a Chapter 3

1.2.2 Workers responsibilities

Workers have responsibilities to comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety in the workplace, including in relation to hazardous chemicals. The specific requirements are outlined and referenced below:

Worker responsibilities	Reference
• Being aware of the location of the hazardous chemical register and safety data sheet (SDS) for ready reference.	Chapter 3
• Referring to the SDS and risk assessment or work procedure when using a chemical for the first time to ensure any precautions for use are known and followed.	Chapter 2 & 5
• Following the advice for usage based on the information given on the label and SDS.	Chapter 2
• Assisting in completing risk assessments and identifying control measures prior to using hazardous chemicals.	Chapter 5
• Using safety equipment or personal protective equipment when required; and to take reasonable care in the operation or use of anything provided for workplace health and safety at the workplace.	Chapter 3
• Advising supervisors of any faults in the control systems (e.g. faulty equipment) and any dangerous occurrences, near misses, injuries and illnesses associated with handling of hazardous chemicals.	Chapters 3 & 4
• Hazardous chemicals used, handled, stored, manufactured, transferred or decanted from their original containers are correctly labelled.	Chapter 4

1.2.3 Contractor, visitor and students responsibilities

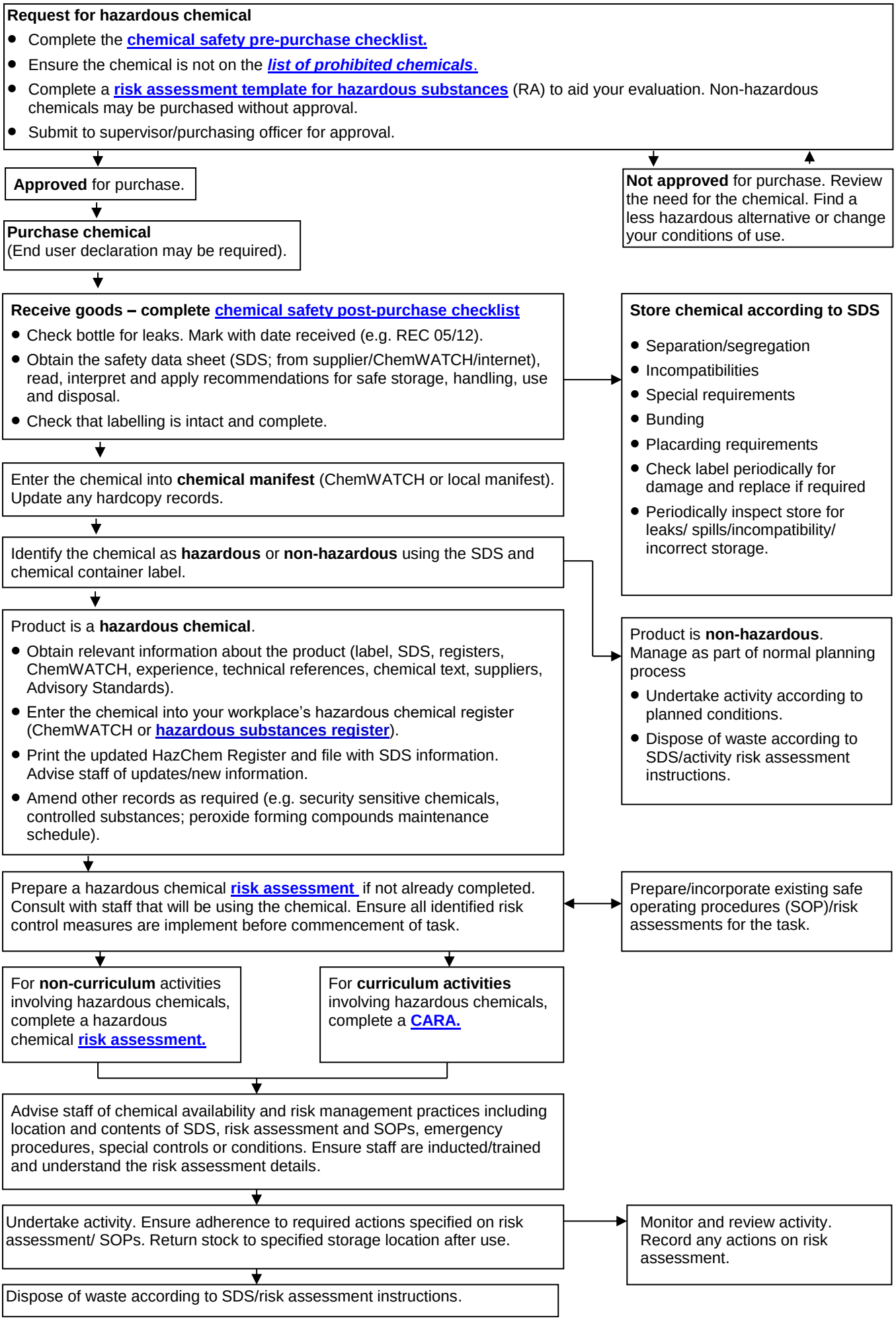
Contractors, visitors and students also have workplace health and safety responsibilities with respect to hazardous chemicals. The specific requirements are outlined and referenced below:

Other persons responsibilities	Reference
• Being aware of the location of the hazardous substances/dangerous goods register and safety data sheet (SDS) for ready reference.	Chapter 3
• Referring to the SDS when using a chemical for the first time to ensure any precautions for use are known and followed.	Chapter 2
• Following the advice for usage based on the information given on the label, SDS and risk assessment or work procedure.	Chapter 2
• Assisting in completing risk assessments and identifying control measures prior to using hazardous chemicals where relevant.	Chapter 5 App 5a
• Using safety equipment or personal protective equipment when required.	Chapter 3
• Advising departmental staff of any faults in the control systems (e.g. faulty equipment) and any dangerous occurrences, near misses, injuries and illnesses associated with handling of hazardous chemicals.	Chapters 3 & 4
• Contractors comply with legislative obligations including having appropriate SDS, labels, risk assessments, work method statements and control measures in place for work they undertake on site to ensure risks to DoE communities are managed.	Chapter 3

1.3 DoE chemical management overview

⚠ **An overview of chemical management processes is provided in figure 1.1. This flowchart outlines the minimum expectations for safe work practices involving chemicals in DoE workplaces.**

Figure 1.1: Flow chart for chemical management from purchase to disposal.



Chapter 2: information, communication and training

Information, communication and training

Information and communication about the possible hazards as well as training in the safe use of chemicals are important control measures to ensure the safe management and use of chemicals.

It is important that all chemical users understand the different ways chemicals enter the body and what sort of effects may occur. Preventing **exposure** through applying the most effective control measures is the best way to ensure workers minimise the risk of both acute and chronic health effects. Refer to Appendix 2a for specific information on chemical exposure.

2.1 Sources of information

There are a number of sources of information available for the management and safe use of chemicals. The first source of information users of chemicals will encounter is the chemical container **label** which, by legislation, must include basic identification, warnings and precautionary information. More detailed information regarding a specific chemical is provided in a chemical's **safety data sheet** (SDS).

Direct contact by telephone, e-mail or facsimile with the chemical manufacturer or supplier can usually be made through the information provided on the label or SDS. Your Workplace health and safety advisor, Regional health and safety consultant, Institute health and safety managers/coordinators and/or the health and safety staff in the Organisational health unit can also provide advice and assistance on the management and safe use of chemicals.

2.1.1 Safety data sheets

A safety data sheet (SDS) is a document that provides information on the properties of a chemical including the hazards and consequences of exposure. An SDS helps you to safely manage storage, handling and use of hazardous chemicals in the workplace.

An SDS must:

- be written in English;
- contain measurements in Australian legal units (e.g. mL, L, cm^3);
- state the date it was last reviewed, or if it has not been reviewed, the date it was prepared; and
- state the name, Australian address and business telephone number of (i) the manufacturer or (ii) the importer

SDS formats are moving to a standardised format under the GHS to communicate hazard information in a structured way. An SDS must contain the following information about the chemical:

- Section 1 – identification – product identifier and chemical identity
- Section 2 – hazard(s) identification (no hazards are identified = non-hazardous chemical)
- Section 3 – composition and information on ingredients
- Section 4 – first-aid measures
- Section 5 – fire-fighting measures
- Section 6 – accidental release measures (spill control)
- Section 7 – handling and storage (describes how the chemical may be safely used and stored)
- Section 8 – exposure controls and personal protection
- Section 9 – physical and chemical properties
- Section 10 – stability and reactivity
- Section 11 – toxicological information
- Section 12 – ecological information
- Section 13 – disposal considerations
- Section 14 – transport information (useful for DG placarding and disposal manifests)

- Section 15 – regulatory information
- Section 16 – any other relevant information

The *WHS Regulation 2011* (s339) requires the supplier of a hazardous chemical to a workplace to:

- ensure that the current SDS for the hazardous chemical is provided with the hazardous chemical:
  - when the hazardous chemical is first supplied to the workplace (if the supply is the first supply of the hazardous chemical to the workplace for five years); and
  - when the hazardous chemical is first supplied to the workplace after the SDS is amended.

The *WHS Regulation 2011* (s344) requires the **workplace** supervisor/manager to:

- obtain a SDS for a chemical from the manufacturer, importer or supplier no later than when the chemical is first supplied at the workplace, or as soon as possible after it is first supplied but before it is used at the workplace;
- keep a register containing a list of all hazardous chemicals used at the workplace and put a copy of the SDS in the register;
- take reasonable steps to ensure the SDS is not changed other than by the manufacturer or importer; and
- keep the SDS close to where the chemical is being used as it provides all workers with the necessary information to safely manage the risk from chemical exposure.

Where an SDS is not accessible through an electronic SDS database (e.g. ChemWatch) chemical users can request an SDS directly from the supplier or manufacturer of the chemical.

When providing access to an SDS for a worker, the needs of the workplace should be considered (e.g. frequency of use, storage space, accessibility, printed vs. electronic). Workplaces may choose to provide access to SDS via:

- paper copy collections of SDS (these collections are often convenient but use considerable paper resources); or
- computerised SDS and internet databases (information is always current).

Any electronic storage and retrieval equipment used to provide access to an SDS (e.g. computer) should be kept in good working order. Where information is displayed on a screen, there should be a means of obtaining a paper copy of that information for example as hard copies in a filing system (*Managing risks of hazardous chemicals in the workplace – Code of Practice 2013* s2.2).

Within the workplace, the supervisor/manager should also ensure that:

- workers are aware of the location and content of the SDS;
- workers are able to freely access SDS close to where they work with chemicals. If accessed through electronic means, workers should know how to use the electronic database;
- workers can interpret the SDS information to safely manage the hazardous chemical; and
- the SDS is no more than five years old.

It is important that workers know how to read and interpret an SDS. In some cases, workers may find a shortened form of the SDS to be preferable for quick reference in general use situations, rather than the longer, more complex full version. In these situations, the full version should always be available for further reference.

2.1.2 ChemWATCH

ChemWATCH (GoldFFX) is an online chemical database that provides a number of helpful chemical management features. The department has an online subscription to ChemWATCH that can be accessed through the chemicals and hazardous substances section of the creating healthier workplaces website. The database itself can be opened here. An eLearning training link for GoldFFX is available here.

Chemical users can request ChemWATCH to upload a vendor SDS to the database once it has been sourced. Note that legislative compliance **requires the use of the vendor SDS** for hazard management. SDS *review* documents generated by ChemWATCH do not meet legislative requirements for valid hazardous substance product disclosure, hazard identification and risk management. This is because they are reviews

of SDS – it is the manufacturer's responsibility to compile the complete SDS. Therefore, the manufacturer's SDS provides the most accurate information about the chemical.

2.1.3 Labelling

Labelling of chemicals is a critical issue because it is the most visible hazard communication tool. The label is often the first source of information alerting users to the inherent hazards of a chemical and any instructions for its safe storage, handling and use. In the workplace, you must ensure that:

- any hazardous chemical that is used, handled or stored at the workplace is correctly labelled (i.e. a label, so far as reasonably practicable, accurately reflects the hazardous contents is fixed to the container);
- a hazardous chemical is correctly labelled if the chemical is 'manufactured' at the workplace (a dilution or reactant); or transferred or decanted from the chemical's original container at the workplace; and
- containers that are labelled for holding a hazardous chemical are used only for the use, handling or storage of the hazardous chemical (*WHS Regulation 2011 s341-343*).

Specific labelling requirements for decanted and transferred chemicals, research chemicals, small containers and waste are discussed in Chapter 4. ChemWATCH may be used to generate custom labels for these sized containers. An eLearning training link for ChemWATCH custom labels can be accessed here.

2.2 Communication and consultation

Staff should be consulted on chemical issues which may affect their health and safety. Workers know their jobs and the risks involved and are more easily able to identify these risks and contribute to discussions related to their jobs. Consultation also provides an opportunity for staff to contribute to the decision making process and increase their commitment to the safe management of chemicals.

Consultation can take place through formal and informal processes such as the health, safety and wellbeing committee or discussions held between workplace management, workplace health and safety representatives and workers. A primary focus of these consultative activities should be hazard identification, risk assessment and risk control. The consultative process should cover the:

- introduction of new chemicals to the workplace (Ch. 4);
- identification and assessment of risks associated with chemicals at the workplace (Ch. 5);
- decisions about control measures to be implemented (App 5a);
- induction and training requirements (Ch. 2, Ch. 5);
- advice to workers with potential exposure to particular chemicals (App 2a);
- selection of registered medical practitioner for health monitoring where required (App 2a); and
- relocation of workers to suitable alternative work because of health monitoring results (where required).

Some of these consultative requirements can be addressed by ensuring chemical management is a standing agenda item for health, safety and wellbeing committee meetings.

2.3 Training

The results of consultation and risk assessments for the use of chemicals can be used to identify knowledge and skill gaps and choose training methods. Training can take many forms including:

- **Induction –** all staff working with chemicals are to be provided with induction and regular refresher training, relevant to their area of work. The training is to address:
  - nature of hazards of the chemicals and processes they are working with
  - normal operating procedures
  - control measures including the use of PPE and other safety equipment, and
  - emergency action.

  The Managing risks with chemicals induction presentation available from DoE's creating healthier workplaces provides a general introduction to the department's expectations for the safe management of chemicals in DoE workplaces.

- **Formal training** – addresses specific needs of the workplace or workers and may be of a theoretical nature. Issues may cover legislative requirements, relevant information about hazardous chemical, use of personal protective equipment (PPE) and emergency procedures.
- **On-the-job training** – covers supervised training received while actually doing the job. This form of training should be used to introduce a new/redesigned process or chemical into the workplace and the precautions for its use.

People to be trained include:

- workers who may be exposed to a hazardous chemicals at work and their supervisors
- supervisors of workers at risk from exposure to a hazardous chemical
- workplace health and safety committee members and representative/s
- workers responsible for the purchasing of chemicals, control equipment, personal protective equipment and for the designing, scheduling, organisation and layout of work, and
- those who have direct involvement in fire or other emergency action.

The extent of a training program and the amount of detail required will depend on:

- the hazards associated with a substance used in the workplace
- the complexity of the work procedures, and
- any controls, work practices and personal protective equipment required to minimise risks.

Any training should be documented and maintained (refer to section 3.6).

Any special needs of workers should be taken into account in deciding on the structure, content and delivery of training. These special needs may include literacy levels, work experience and specific skills required for the job.

Pertinent information should be provided to all relevant people about the equipment used to prevent exposure to chemicals, such as exhaust ventilation systems. The following information should be available:

- the use for which the equipment is designed
- the conditions necessary for its use, and
- results of tests that have been carried out in connection with the safe operation of the equipment.

The legislation places responsibilities on employers to meet these responsibilities. The department expects managers and supervisors to:

- provide a worker who may be exposed to a hazardous chemical with induction and ongoing training about the substance having regard to the level of risk identified in the risk assessment and the workers who may be exposed to the substance, and
- keep a record of the induction and training for ten years stating the date of the session, the topics dealt with, the name of the person who conducted the session, and the names of the workers who attended.

Appendix 2a – effects of chemical exposure

It is important that all chemical users understand the different ways chemicals get into the body and what sort of effects may occur. Preventing exposure through the implementation of the most effective control measures is the best method to ensure workers minimise the risk of both acute and chronic health effects. Control measures should be implemented in the following order:

Get rid of the harm or prevent the risk (e.g. **eliminate** the use of a chemical). If this is not possible:

- **Replace** with something less harmful.
- **Separate** people from the harm.
- Change work processes or the physical work environment, (e.g. by **redesigning** work, plant, equipment, components or premises).
- Apply **administrative** arrangements, (e.g. limit entry or time spent in a hazardous area).
- Use **personal protective equipment**

Entry of chemicals into the body

Chemicals will only enter the body if workers are directly exposed to the chemicals. Sufficient and adequate control measures should always be used to ensure that exposure to chemicals does not occur. Chemicals may enter the body by the following routes:

Ingestion: ingestion is rare and is the result of unusual accidents or deliberate poisoning attempts. Small amounts of inhaled dusts may be ingested but are unlikely to cause systemic or digestive disturbances.

Inhalation: inhalation represents the most rapid and direct route of entry because of the close association of air passages with the circulatory system. The degree and rate of absorption of chemicals into the body from the respiratory system is dependent upon:

- Concentration of chemical in the atmosphere; higher concentrations increase absorption rates and degree of absorption.
- Duration of exposure; longer periods may increase the final rate of absorption and the degree of absorption.
- Solubility of chemical in blood and tissue; generally, fat soluble chemicals will be absorbed and retained in the body longer than non-fat soluble compounds.
- Reactivity of chemicals; refers to the rate at which a chemical undergoes a chemical reaction. Some chemicals may continue to be part of a chemical reaction over a long period of time and other chemicals may have a short reaction time.
- Respiration rate; increased respiration rate will normally increase the rate and degree of absorption. This is particularly important in occupational exposures where heavy physical exertion is required e.g. carbon monoxide in vehicle repair work.
- Particle size and shape (dust and aerosols). Larger sized particles are called inhalable dust. Most of this will be filtered out in the nose and throat. Smaller size dust (thoracic dust) can reach the lungs. If the dust is small enough it can be inhaled deeply. This is called respirable dust. Very small particles can pass through the lungs into other organs of the body. Smaller particles also stay in the air for much longer so can be a danger for a longer period of time.

Injection: accidental injection of chemicals and other substances such as biological material and diseases into the body is also rare. This is usually a result of a needle stick injury or exposure to work involving compressed air, gases or fluids that are forced through the skin barrier.

Skin absorption (including the eye): the barrier that skin can provide to chemicals ranges from very effective to poor. Contact with chemicals can result in damage or effects such as irritation, sensitisation, penetration of the skin, absorption of the chemical or corrosive damage.

The skin absorption rate is the rate at which chemicals are transported across the skin barrier and is dependent on:

- thickness and area of skin;
- condition of skin – cuts, scratches, abrasions etc. will aid absorption;

- the presence of skin structures such as hair follicles, sebaceous glands and sweat glands. These may provide an effective route for chemicals to cross the skin barrier;
- presence of fat soluble solvents, e.g. the absorption of phenol from certain paint strippers is increased by the presence of fat soluble methylene chloride in the formulation;
- temperature of chemical or solvent; and
- presence and amount of perspiration.

Removal of chemicals from the body

Chemicals may be removed (excreted) from a person's body through the following biological processes:

- lungs remove volatile chemicals in exhaled air. However, the chemicals may cause respiratory irritation and tissue scarring;
- digestive tract may pass ingested chemicals through the gastrointestinal tract and be eliminated in the faeces;
- liver metabolises chemicals to more water soluble materials and eliminates some chemicals in the bile. However, some chemicals can permanently impair liver function; or
- kidneys eliminate compounds in urine. However, some chemicals may cause damage to the kidney filtration system

Effects of chemicals

The effects of chemicals on people can be divided into a number of categories. The different types of effects of chemicals on people are:

Local effects: local effects are adverse effects to the particular tissue to which the substance is exposed, for example:

- Corrosive substances which can severely damage the skin and eyes.
- Organic solvents may induce dermatitis.
- Irritant gases (chlorine, ammonia) can intensely irritate the respiratory tract.

Systemic effects: systemic effects are adverse effects on a system of the body after absorption, for example:

- Lead can affect the nervous system, blood, kidneys and reproductive functions.
- Pesticides usually affect the nervous system.

Acute effects: acute means the adverse effects are short lasting and develop during or soon after exposure, for example:

- Irritant gases immediately irritate the eyes and respiratory tract.
- Excessive exposure to organic solvents can induce narcotic effects quickly i.e. headache, dizziness, unconsciousness.

Chronic effects: chronic means the adverse effects are long lasting, if not permanent. Onset of an illness may occur soon after exposure or it may be delayed by many years, for example:

- Asbestosis and silicosis following excessive exposure to asbestos and free silica.
- Chronic renal failure after excessive exposure to lead.
- Chronic dermatitis from skin irritants e.g. solvents and cleaning agents

Hazardous atmosphere and health monitoring

Hazardous atmosphere monitoring

Hazardous atmosphere monitoring is the sampling of the air a worker breathes at a workplace to check exposure to a hazardous chemical. Quantifying exposure to a hazardous chemical is fundamental to determining and providing adequate controls to minimise (or prevent) a worker breathing in contaminants. Contaminants may occur in the form of a fume, mist, gas, vapour, dust or micro-organism. Hazardous atmosphere monitoring provides a reliable estimate of exposure because it is the primary means of making a comparison with scientifically established exposure standards. Monitoring is performed by external organisations with specialist skills and equipment, and requires a 'target' of contaminates rather than indiscriminately monitoring the environment for any contaminate.

The risk assessment process for hazardous chemicals uses information about exposure to assist in making the assessment. In most of the simpler cases, the extent of exposure can be gauged from observation and relevant detail from the label and SDS. There are some instances, however, where the procedure of

observing a process aided by an SDS and a label will not provide reliable estimates of exposure. Examples include:

- a breathable dust often cannot be seen
- a visible dust concentration cannot be judged by eye, and
- some airborne contaminants have no odour so their presence is undetected.

If hazardous atmosphere monitoring is required, DoE, as an employer, has an obligation to make sure monitoring is done as soon as possible, record the result of monitoring and ensure a worker who may be exposed to a hazardous chemical at the workplace is given a copy of the record and can inspect the record at any time.

Health monitoring

There should be no situations in departmental workplaces which would result in staff requiring health monitoring.

It would be an extremely rare circumstance in which the benefits of an activity would justify a person being exposed to a substance that would warrant health monitoring.

Exposure to hazardous chemicals can have a broad range of health effects depending on the amount of chemical present and the length of exposure. Some chemicals have more profound effects than others. As a result, there are certain legal obligations relating to the monitoring of a worker's health that may be exposed to certain chemicals in their workplace.

Health monitoring must be provided for employees who work with the hazardous chemicals listed below as part of their normal duties. Health monitoring (done through the testing of body fluids and body function) is sometimes necessary to ensure worker's ongoing health. Workers should be made aware that DoE is required by law to ensure that workers exposed to a hazardous chemical have health monitoring, where:

- it is specifically required by legislation for exposure to that substance (see list below); or
- an identifiable adverse health effect has happened, or may happen under the worker's work conditions, and valid health monitoring or biological monitoring techniques exist.

Hazardous substances requiring health monitoring (Ref: *WHS Regulation 2011 Schedule 14*, tables 14.1 and 14.2 or otherwise listed)

- 4,4 Methylenebis (2-chloroaniline) (MOCA)
- Acrylonitrile
- Benzene (prohibited substance for schools)
- Cadmium
- Creosote (prohibited substance for schools)
- Crystalline silica
- Inorganic arsenic
- Inorganic chromium
- Inorganic mercury
- Isocyanates
- Organophosphate pesticides (prohibited substance for specified groups)
- Pentachlorophenol (PCP)
- Polycyclic aromatic hydrocarbons (PAH)
- Thallium
- Vinyl chloride
- Inorganic lead (lead processes and lead risk work (*WHS Regulation 2011*, s7.2)
- Asbestos (*WHS Regulation 2011*, s8.5) DoE prohibited substance

Workplaces are required to consider using alternative substances if available and eliminate any listed substance from the workplace. Contractors that propose the use of any of these substances while working in DoE workplaces should be strongly encouraged to use alternative products to eliminate the risk of exposure for DoE staff and students (for example, see section 4.8.1).

If a workplace chooses to use any chemical listed above, a risk management process is required to demonstrate how the risks are to be managed (during all phases of preparation, use and disposal). The risk assessment must also specifically determine any requirements for health monitoring.

While departmental staff may undertake activities involving exposure to some of these substances (for example the use of inorganic lead, chromium and mercury compounds for science experiments), the majority of activities would not meet the requirements for prescribed health monitoring *provided the risk of exposure to scheduled chemicals is controlled appropriately* using (but not limited to) the safety precautions listed below:

- use alternatives that are less hazardous;
    - if the product must be used, conduct and document a risk assessment to identify the hazards and controls and review controls; considering
        - information from the product SDS and product label
        - potential exposure
    - ensure the quantities handled and exposure times are minimal;
    - ensure the generation of, and exposure to, dust and fumes is minimised through appropriate handling practices and appropriate ventilation;
        - ensure this is considered in all uses i.e. including preparation of solutions from powders, any processes the chemical is used in; and any disposal procedures.
    - use appropriate safety equipment and personal protective equipment as prescribed by the SDS (e.g. fume/dust extraction, gloves, etc.);
    - undertake good hygiene practices (e.g. hand washing before eating, toileting, etc.); and
    - keep a register of all hazardous chemicals including all compounds of those substances listed above.

The risk assessment must apply the risk management hierarchy of control i.e. whether the product can be eliminated or substituted for an alternative substance that poses less risk (see appendix 5a).

⚠ If your risk assessment determines that exposure risks are significant and health monitoring is required, then the chemical is not to be used because it requires health monitoring and its use is therefore contrary to DoE guidelines and intent for the use of these chemicals.

If exposure to dust or fumes is not significant, and you cannot substitute a safer chemical you may use the product. However, you must ensure that any control measures identified in your risk assessment are put in place and are effective before you start your activity. You should monitor the controls to ensure they remain effective and make any changes necessary to limit exposure. Document and implement any changes.

Should health monitoring be required due to identifiable adverse health effects in the workplace, the department is required to:

- arrange and pay for health monitoring that is done or supervised by a designated doctor;
- ensure that the appropriate health monitoring is provided;
- ask the designated doctor for a health monitoring report;
- ask the designated doctor to give the worker a report and an explanation of the report;
- obtain a worker's medical record only with the worker's written consent;
- disclose the contents of the worker's medical record only with the worker's written consent; and
- retain the records for at least 30 years (*WHS Regulation 2013*, s368-37.

Further information

- Safe Work Australia's *Hazardous chemicals requiring health monitoring* (2013)
- WHS Queensland's health monitoring page.
- Contact your Regional health and safety consultants, Institute health and safety managers/coordinators and/or the health and safety staff in the Organisational health unit to determine any necessary health monitoring measures.

Chapter 3: documentation and record keeping

Documents and records

The following documents are to be used as part of workplace management practices for chemicals. The documents are either a specific regulatory requirement or required through legislation to show how the exposure to risk of injury or illness for workers using chemicals in the workplace is managed.

3.1 Chemical manifest

A chemical manifest is a written summary of hazardous chemicals with specific physicochemical hazards and acute toxicity hazards that are used, handled or stored at a workplace (*Managing risks of hazardous chemicals in the workplace – Code of Practice 2013*, s1.6).

A manifest is *only* required if the workplace holds chemicals that exceed the threshold amounts listed in Schedule 11, column 5 of the *WHS Regulation 2011* (s347). Prescribed quantities may be exceeded if the manifest quantity is exceeded for at least one dangerous goods (DG) category or an aggregation of dangerous goods.

For example, in DoE workplaces manifest quantities may be exceeded due to bulk storage of pool chlorine (sodium hypochlorite):

- in a tank with a capacity >500 L (i.e. the manifest quantity is exceeded for at least 1 DG category); or
- by a 250 L hypochlorite tank plus 6 x 18kg (264 L) of LP gas (i.e. the manifest quantity is exceeded for an aggregation of DG categories)

The purpose of the manifest is to provide the emergency services with information on **the quantity, type and location of dangerous goods stored** on the premises so as to enable them to respond appropriately if called to an incident. The manifest is different to the hazardous chemical register (section 3.2) as it holds much more detailed information about the workplace. If a manifest is required, then:

- a site plan is required;
- all tanks (vessels with capacity >500 L) must be listed in manifest document and identified on a site plan and placarded; and
- for packages, only areas that have more than a placard quantity need to be identified in the manifest and site plan. (See section 4.6 for placarding information).

Further information on manifest and site plan requirements can be found in the WHSQ publication *Manifest requirements for hazardous chemicals under the Work Health and Safety Act 2011*. The manifest must comply with Schedule 12 of the *WHS Regulation 2011.*

A manifest is not required if the manifest quantity is not exceeded for any category or aggregation of categories. For DoE workplaces, it may be that manifest quantities are not exceeded across a site. This means that a manifest may not be 'legally' required. However, it is strongly recommended that DoE workplaces use chemical manifests for the following reasons:

- Manifests provide a full list of chemicals on site and an effective tool to manage stock purchasing.
- The manifest can be used to generate a hazardous chemical register.
- If you use ChemWATCH to manage your chemicals, the manifest is required to generate data for:
  - the risk assessment module;
  - hazardous chemical register; and
  - chemical storage incompatibility functionality.
- Assists with risk management and provides valuable advice to emergency services e.g. storage locations.

Chemical manifests may be generated, maintained and exported through programs such as ChemWATCH. A simple manifest may consist of an EXCEL spread sheet or a written list, e.g. appendix 3a. Any electronic storage and retrieval equipment used to provide access to the manifest should be kept in good working

order. Where information is displayed on a screen, there should be a means of obtaining a paper copy of that information. An electronic copy of Appendix 3a can be accessed from the Managing Risks with Chemicals in DoE workplaces procedure page.

3.2 Register of hazardous chemicals

The *WHS Regulation 2011* (Part 7.1 s346) requires that a register of hazardous chemicals at the workplace be prepared and kept up to date. The register must be readily accessible to workers involved in using, handling or storing hazardous chemicals and to anyone else who is likely to be affected by a hazardous chemical at the workplace e.g. contractors, cleaners. At a minimum, the register must include:

- a list of hazardous chemicals used, handled or stored at the workplace;
- the current (<5yrs) SDS for each hazardous chemical listed; and
- it should also include decanted hazardous chemicals.

Keep a copy of the SDS with the *Register of hazardous chemicals* and a second copy close to where the chemicals are used (see appendix 3a). For the purpose of identifying chemicals as hazardous for entry into the register, SDS users should note that the new GHS SDS format will identify a chemical as hazardous in Section 2: Hazard(s) Identification. If there is an entry in this section, then the chemical is classed as hazardous. If the section is blank, then the chemical is not considered hazardous as there is no hazard classification.

The hazardous chemical register is your reference point for information about hazardous chemicals. The register also helps the principal/manager of the workplace to keep track of the hazardous chemicals in their workplace. The register must be updated as new hazardous chemicals are introduced to the workplace or when the use of a particular hazardous chemical is discontinued.

3.3 Chemical risk assessments

Detailed information about chemical risk assessments is presented in Chapter 5. Documenting the risk assessment process is important as it:

- is evidence of the decision making process that has been undertaken;
- shows the control measures that have been determined to manage the risks and the reasons why they must be used; and
- provides the users of the chemicals with health and safety information, including the appropriate control measures that are to be used for the activity or situation.

Risk control measures must be reviewed within five years after the last review date or when a change is made, an incident occurs or something new is introduced *(WHS Regulation 2011 Pt7.1 Div5 s352).*

3.4 Safe operating procedures

A safe operating procedure (SOP) is a simplified summary of the information you know about a work process or procedure. It is based on the outcomes of risk assessments, label and SDS information, operator experience, workplace conditions and industry practice.

An SOP shows the agreed or ‘standardised’ way to conduct an activity or process safely. It can be used as both an information source and a training tool to ensure that chemical users and their supervisors know the requirements for safely conducting a chemical process or activity. A template for a safe work procedure is shown in appendix 3b. Review SOPs annually and retain them for as long as the activity is undertaken.

3.5 Maintenance records

Any equipment operated in association with the use of chemicals should be well maintained to ensure safe operation. Records should be kept of any maintenance and repairs performed on the equipment (e.g. inspection and testing records for engineering controls) and retained for the life of the equipment, or passed on when equipment is sold.

Sample Equipment Maintenance Records (EMRs) that can be adapted for your equipment are available here.

Refer to the Managing risks of plant Code of Practice 2013 for health and safety information about plant and equipment. Refer to Departmental procedures Equipment management for schools and Equipment management for business units for information about managing the assets.

3.6 Training records

Records of any training conducted for chemical users and other persons in the workplace should be maintained by the workplace. Training records must be kept for a minimum of ten years and must contain all the relevant information about the delivered training including:

- date of the session
- topics covered
- name of the person who conducted the session (or company)
- names of the workers who attended.

3.7 Health monitoring and hazardous atmosphere monitoring records

Refer to Appendix 2a for information about health and hazardous atmosphere monitoring. **There should be no situations in departmental workplaces which would result in staff requiring health monitoring.** However, if undertaken, monitoring and surveillance records must be maintained at the workplace for 30 years. DoE's Organisational safety and wellbeing unit should be advised if health monitoring and/or hazardous atmosphere monitoring is required.

Further information about record keeping and document retention can be found at:

- Records retention and disposal (intranet page)

Appendix 3a – sample chemical manifest

Chemical manifest

Workplace location: **Supervisor:**

Department name/number: **Date:**

Building name/number:

Cas no	Chemical name	Manufacturer's name	Maximum quantity L or kg (specify unit e.g. 4 x 500g)	DG class	Sub risk	Packaging group (I, II or III)	UN No	Hazardous substance Yes/No	Poison schedule	SDS (dd/mm/yy) (<5 years old)	Storage location (room no.)

Appendix 3a – sample register of hazardous chemicals

Hazardous chemical register

Workplace Location: **Supervisor:**

Department Name/Number: **Date:**

Building Name/Number:

Cas no	Chemical name	Manufacturer's name	Maximum quantity L or kg (specify unit e.g. 4 x 500g)	DG class	Sub risk	Packaging group (I, II or III)	UN number	Hazardous substance	Poisons schedule	Safety data sheet (dd/mm/yy) Less than five yrs old	Storage location (room no.)	HazChem code	Risk assessment ref no	Risk assessment review date	Controls in place/comments

Note: this format may be easier to use as an integrated Excel spread sheet or as an access data base. An electronic copy is available of this document is available at the Managing Risks with Chemicals in DoE workplaces procedure page. You do not need to use this template if you already maintain your manifest on ChemWATCH as ChemWATCH allows you to generate a hazardous chemical list from your manifest. See S2.1.2 for more information on ChemWATCH

Appendix 3b – safe operating procedure

Copy this appendix to a new word document to create a master template for writing SOPs that involve chemicals for your workplace.

SAFE OPERATING PROCEDURE [NAME OF CHEMICAL ACTIVITY]		
SOP No:	**Version no:**	**Review date:**
Chemical work process ☐	**Hazardous chemical** ☐	**Hazardous chemical class** ☐
[General advisory statement]		
DESCRIPTION OF WORK PROCESS, CHEMICAL OR HAZARD CLASS:		
POTENTIAL HAZARDS: •	•	•

PERSONAL PROTECTIVE EQUIPMENT

	Eye protection as identified in SDS must be worn at all times.		Appropriate footwear with substantial uppers must be worn.		Protective gloves as identified in SDS.
	Protective clothing must be worn.		Protective clothing must be worn.		Protective clothing must be worn.
	Respiratory protection as identified in SDS must be worn.		Maintain personal hygiene throughout work processes.		Face shield must be worn.
	Ear protection must be worn.		Hearing and eye protection must be worn.		Mandatory requirements are specified and must be followed. Report any accidents.
	Store in a secure location/ keep locked up.		Keep aisle and work area clean.		All cylinders must be secured with a chain.
	A welding mask is required for this process.		Switch power off after use.		Use machinery guards.

PRE-OPERATIONAL SAFETY CHECKS/SPECIAL HANDLING AND STORAGE REQUIREMENTS

•

OPERATIONAL SAFETY CHECKS (control measures in place)

Ensure all hazards are controlled at all times through good work practice

•

STEP BY STEP WORK PROCEDURE

•

WASTE DISPOSAL:

EMEREGENCY RESPONSE- FIRST AID:

Emergency safety equipment:

Spill kit and spill response:

Clean up/decontamination:

Fire control:

Person(s) completing the SOP:	**Role/position(s):**

Instructions for developing a safety operating procedure (chemicals)

A **safety operating procedure** (SOP) is a written procedure explaining how to safely work with chemicals. A SOP helps to ensure a safe work environment by documenting the key risks associated with an activity and how the risks can be controlled.

There are three ways that you can use this SOP template for your activity:

- For a **chemical work process:** (spraying, dilution, mixing, storage, distillation etc.)
- For a **hazardous chemical**: (Amazon, ethanol, pool chlorine, hydrochloric acid etc.)
- For a **hazardous chemical class**: (a group of compatible flammables, corrosives, oxidizers etc.)

A SOP can link your safety operating procedure to a companion CHEMICAL RISK ASSESSMENT to show all your risk mitigation processes.

Filling in the SOP template

Chemical activity: modify the title box at the top of your SOP so that it clearly identifies the type of activity you are undertaking. Fill in the SOP number (a number that has meaning for your workplace), version number and review date to allow for effective tracking, reviewing and archiving of your documents.

Activity type: identify the type of activity the SOP is being used for by checking the box (double click on the box and select 'checked' in the dialogue box) for either a:

- **Chemical work process** – briefly describe the process which involves hazardous chemicals. List all chemicals used in the process.
- **Hazardous chemical** – list the hazardous chemical for which the SOP is being developed. Include the CAS or UN number (this helps with accurate chemical identification) and product name used for the chemical.
- **Hazardous chemical class** – describe the hazards associated with a particular group of similar chemicals and list the chemicals used in the work space. List all chemicals used in the process.

Complete a **general advisory statement** in the green box that identifies the main hazards associated with the activity and describes the safest way to undertake the activity. For example, an advisory statement for preparing a dilution of acid could be written as *"When diluting liquid acids for use as laboratory agents, special precautions must be taken as concentrated acids are corrosive and cause serious burns".*

Description of work process, chemical or hazard class: describe the process used in the activity. You may find it helpful to outline the process in a step-by-step list.

- For specific chemicals, include **concentrations** and the **volume** required.
- Describe the approximate **frequency and duration** of use, and **location** of use.
- Insert a copy of your specific procedures for working with this particular chemical work process, hazardous chemical or hazard class if they are listed elsewhere (e.g. on the chemical label, in a reference manual).

Potential hazards: list the potential hazards for each chemical work process, hazardous chemical or hazardous class that you have identified.

- Include physical and health hazards such as fire, explosion, exposure hazards (burns to the skin, toxic fume generation and absorption through the skin).
- Refer to the chemical SDS or the chemical label, instruction manuals and other reference material.
- Be sure to include any hazards that may be associated with the work environment and equipment used to undertake the task.

Personal protective equipment (PPE): Eye, skin and body protection is important to protect against chemical exposure. You can use the chemical's safety data sheet, label and/or manufacturer's instructions to identify the required level of PPE and hygiene practices needed for your activity.

A selection of PPE pictograms and directives is provided in a table for your use. It is by no means comprehensive. Relevant additional information should be sought from other sources if required. Simply delete or add any protective equipment pictograms and modify any written descriptions listed in the safety data sheet or on the label that may be required to undertake the activity safely.

Pre-operational safety checks/special handling and storage requirements: provide details on any actions that need to be implemented before starting the activity. These may include, but are not limited to:

- specified SDS requirements
- setting out equipment required to safely complete the task
- checking for adjacent hazards in the workplace
- ensuring personnel are familiar with safety procedures, and
- compliance (e.g. ACDC compliance for herbicides).

List any handling and storage requirements for the hazardous chemicals involved in the SOP, including:

- specific handling instructions
- storage areas
- storage according to compatibility and policies regarding access to chemicals, and
- special procedures such as dating chemicals upon receipt, and expiry dates should be listed.
- Also, indicate the location of other pertinent safety information, i.e. SDS, risk assessments, equipment manuals, chemical references etc.

Operational safety checks (controls in place): list any safety checks or control measures that need to be used during the work process (e.g., replace lids on chemicals immediately after use, clean up spills immediately, change gloves if chemical contact occurs). Describe engineering controls that will be used to prevent or reduce exposure to hazardous chemicals for the chemical work process, hazardous chemical or hazard chemical class. This includes ventilation devices such as fume hoods, safety screens etc.

Step by step procedure: list the steps (i.e. instructions) that will be followed to complete the activity.

Waste disposal: list which materials or substances will require disposal as hazardous waste and indicate how they are to be disposed of.

Emergency response:

- Detail specific **first aid** responses (eyes, skin, inhalation, ingestion) from SDS and identify the location of first aid kits and trained first aid personnel.
- List the location of appropriate **emergency equipment** (spill kits, showers, eye washes and fire equipment). Any special requirements for personnel exposure should also be identified in this section. Identify the location of emergency response phone numbers.
- Detail the nearest **spill kit** location and describe any specific requirements (e.g. neutralising agents, special absorbents or disposal methods). Refer to any **spill response** and emergency guidelines in use in the workplace. Indicate how spills or accidental releases will be handled and by whom.
- Detail any **clean-up/decontamination** actions. If items such as glove boxes, equipment, work surfaces and controlled areas have been contaminated by hazardous chemicals, remove chemical contaminants with appropriate solvents or cleaning solutions.
- List the **fire/explosion responses** for the chemical as described in the SDS.

Person(s) completing the SOP/signature(s): The author(s) of the SOP print their name(s) and sign the document. The SOP should be reviewed annually or sooner if an incident occurs or changes are made.

Save the SOP with other electronic chemical risk management materials or print and use with other safety information in your work area.

Your safe operating procedure can be used as a 'work procedure' or as a training tool

Chapter 4: working with chemicals

Working with chemicals

When working with chemicals it is essential to be aware that they have the potential to cause injury or damage in many different ways. However, injury and damage is not an automatic consequence of the use of chemicals provided that appropriate control measures are developed which take account of all of the hazards of the chemicals and the potential exposures to them. By working your way through this chapter systematically, you will be able to identify the specific hazards associated with the chemicals your workplace holds, minimise the amounts held and determine their safe storage requirements.

Printing out the flowchart from Chapter 1 may also be helpful to track the process.

4.1 Purchasing

Careful consideration should be given to the need to purchase a substance prior to bringing it into the workplace so you do not introduce significant new hazards. The *Chemical Safety Pre-purchase Checklist* (appendix 4a) provides a (non-mandatory) framework to assist you to consider aspects associated with the safe purchase of chemicals. Persons responsible for purchasing chemicals should also be familiar with the *Prohibited Chemicals and High Risk Substances in Departmental Workplaces* list (appendix 4b).

Where chemicals are donated to, or brought onto DoE worksites, prior approval should be obtained from the principal/manager or their delegate before the chemical is introduced to the site. This will ensure the chemical is fit-for-purpose and any associated hazards are adequately identified and controlled. A sample template for the pre-approval process can be found in appendix 4c *Bringing Chemicals into DoE workplaces*. It is preferred practice that chemicals are purchased through established purchasing procedure as risk management protocols are embedded within this system. It is also inadvisable to accept chemical donations as most often their provenance, age and stability are difficult to verify.

4.2 Storage and handling

Proper chemical storage is required to minimize the hazards associated with leaks, spills, and accidental mixing of incompatible chemicals. The quantities of hazardous chemicals should be kept to a minimum, in line with efficient operation, their usage and shelf life. Some chemicals degrade in storage and can become more hazardous (e.g. chloroform can produce phosgene gas from prolonged storage, secondary alcohols can degrade to from explosive peroxides).

When handling and storing chemicals, the following precautions are to be observed:

- Chemicals must not be stored with foodstuffs, personal use products or personal protective equipment.
- Chemicals must never be stored in food/drink containers or containers that are easily mistaken as food/drink containers. (Decanting chemicals into a food or beverage container is an offence under the Poisons Regulations made under the Health Act)
- Ensure chemical containers and their seals or stoppers are appropriate for the type and quantity of chemical stored. As far as is practicable, chemicals should be stored in the containers in which they are supplied.
- All packages in storage are labelled to allow unmistakable identification of the contents.
- Storage of chemicals, including wastes, is based on the properties and mutual reactivities of the chemicals.
- Incompatible chemicals are segregated from one another (e.g. by fire isolation in a chemical storage cabinet or segregation in space). Refer to the Chemical Compatibility and Segregation Advisory Guide in appendix 4d for further information.
- Containers are kept closed when not in use. Packages should only be opened in a well-ventilated area and away from any potential ignition sources if their contents are flammable.
- Where possible, store chemicals on spill trays on shelves or within cabinets and storage rooms.
- Chemicals should be stored in such a manner that leaks cannot affect other substances in the store. Liquids should not be stored above powders and solids.

- Packages are inspected regularly to ensure their integrity. Leaking or damaged packages are removed to a safe area for repacking or disposal immediately. Labels are reattached or replaced, as necessary, to clearly identify the contents of the package.
- Chemicals are stored away from any heating and ignition sources.
- Chemicals which are unstable at ambient temperature are kept in a controlled temperature environment set to maintain an appropriate temperature range. Reliable alternative safety measures are provided for situations when utilities fail, such as power outage.
- Chemicals that present additional hazards on heating, are known carcinogens, radioactive or are dependent on a stabilising agent to maintain the stability of the chemical must be clearly identified.
- Sunlight can affect some plastic containers or the chemical contents. Containers and chemicals must not be stored in a location where they can be exposed to direct sunlight.
- Containers that have held hazardous chemicals are to be treated as full, unless the receptacle or package has been rendered free from hazardous chemicals (triple rinsed) and rendered unsuitable for re-use.
- Regularly review the chemicals held in storage and correctly dispose of those no longer required. This includes hazardous waste products.
- Housekeeping standards for chemical storage areas are rigorous, in particular keeping areas free of combustible materials, obstructions and promptly cleaning up any spilled chemicals.
- Procedures are to be established to deal with clean up and safe disposal of spillages. Equipment needed to control the spillages needs to be readily accessible.
- After handling chemicals, hands should be washed prior to eating or drinking.

4.3 Physical requirements

Where available, chemicals should be stored in a specifically designed enclosed space, such as chemical storage cabinets or chemical storage rooms. Where locations were not designed and built for use with the particular hazardous chemicals, additional care is required to ensure suitability and that risks are controlled.

The **surfaces** on which chemicals are to be stored should:

- be resistant to attack (e.g. staining, degrading, absorbing liquids) from stored chemicals; and
- not react dangerously with stored chemicals.

Minor quantities of hazardous chemicals may be stored on open shelves or work benches. However, as storage in an enclosed space provides a higher level of protection and security, it is recommended that the quantities stored in the open are kept to a minimum.

Where containers are kept on shelves in work areas, the shelves should be wider than the containers. Larger and heavier containers should be kept at about one metre from the floor on stable shelving to avoid the need for difficult bending to retrieve them, or the increased risk of their falling and breaking if placed on higher shelves.

When storing chemicals on **shelves or racks** ensure:

- shelving and its fixtures are compatible with the goods stored, or suitably protected from the goods (e.g. the effects of corrosive fumes);
- the maximum load rating of the shelves is not exceeded (do not overload shelves; and
- shelves used for chemical storage are firmly secured to prevent tipping or sliding and have lips on them to prevent containers being pushed off the shelves.

It is recommended that **chemical storage cabinets** or **chemical storage rooms** are used for the storage of designated hazardous chemicals. However, as each workplace is unique, a risk assessment process is to be used to determine the need for chemical storage cabinets. A risk assessment can also be used to determine whether cabinets require venting. All chemical storage cabinets and rooms should have the following attributes:

- lockable to prevent unauthorised entry into the store and use of the chemicals; the number of access keys should be limited to those workers that use the chemicals in the store. Security of outdoor storages for gas bottles etc. is important to prevent unauthorised access and use;
- bunding (a physical perimeter to prevent the escape of fluids) to contain any spills or leaks, prevent environmental contamination and enable chemical recovery or disposal; and

- good lighting and ventilation for the comfort and safety of the user, and clear bench space for decanting, mixing, cleaning etc.

When determining the **location** of chemical storage cabinets:

- ensure that within a radius of ten metres, measured from any one cabinet, the cabinet storage capacity aggregated for all cabinets in that radius does not exceed 250L or 250kg (AS/NZS 2243.10:2004); and
- the radius is to be measured horizontally through intervening walls, unless those walls are able to prevent the spreading of a fire of the magnitude that could be expected to result from the contents of the cabinet/s.

Cabinets are not to be located:

- one above the other;
- where they can jeopardize emergency escape (a minimum of three metres is recommended between any cabinet and escape door);
- under stairs or in corridors; or
- closer than three metres to ignition sources other than ceiling lights.

Impervious **bunds** should be provided to restrict the spread of product arising from a spill or leakage. This is most important in order to prevent the spread of fire or other hazardous condition, and to prevent environmental damage caused by spread to adjacent water courses or drains. Bunding should be able to contain 100% of the largest chemical container within the bunded area and at least 25% of all containers stored within the bunded area. The need for bunding will be determined by:

- the level of risk at the storage site;
- the type of storage facility;
- the type and amount of liquid being stored;
- the ability to prevent spills and leaks;
- the sensitivity of the environment; and
- the type of drainage.

It is also good practice to provide bunding for all chemicals stored irrespective of the size of the containers. The bunding material must be compatible with the stored chemical. Check the SDS for any compatibility advice. For practicality, the bunding for small quantities could be:

- a plastic bag around a small bottle (short term application);
- a sheet metal tray with or without a plastic liner;
- a sheet metal tray with absorbent material; or
- a plastic tray with a liner or absorbent material (e.g. a strong plastic box with clean sand).

4.4 Separation and segregation

A common practice during chemical storage is to store all chemicals together alphabetically. **This type of storage is dangerous and unacceptable practice in DoE workplaces as it increases the potential risk for unwanted chemical reactions to unacceptable levels.** In order to prevent unwanted reactions from occurring in a storage area, incompatible chemicals should be separated or segregated and stored in compatible groups as per safety data sheet (SDS) requirements.

Separation is the isolation of hazardous chemicals from people and other property, including other hazardous chemicals. Physical separation is the principal method by which such risks are controlled. Separation fulfils a dual purpose: protecting personnel from the hazardous chemicals and preventing unwanted access to hazardous chemicals. The use of distance, effective barriers (such as fire-rated walls or vapour barriers) or a combination of both may achieve separation.

Incompatible classes of chemicals must be segregated to prevent any dangerous reactions. **Segregation** may be achieved by the use of an impervious barrier or by a separation distance sufficient to prevent contamination. Appendix 4d provides an advisory guide chart to assist with determining chemical incompatibilities and the most appropriate storage requirements. Workplace Health and Safety Queensland (WHSQ) provides a more comprehensive Compatibility and Segregation Chart to assist with minimising the risk of storing incompatible goods. This guide is based on the *Australian Dangerous Goods (ADG7) Code and AS3833:2007*. All storage should be undertaken using the DG classification system.

In some situations (e.g. laboratory work benches and cabinets), it may not be practicable to store hazardous chemicals apart by the three or more metres required. Nevertheless, the risk from incompatible goods must still be managed. Control measures may include:

- segregating using a liquid tight partition between incompatible chemicals;
- segregating of incompatible chemicals in different fire-rated, self-bunded chemical storage cabinets;
- storing incompatible chemicals on different shelves however, incompatible goods must not be stored either vertically or horizontally on the same shelves;
- storing glass bottles on lower shelves to minimise breakage; or
- ensuring liquid goods are not placed above solids and powders.

The **SDS** is another source of information for determining which specific chemicals or classes of chemicals are not compatible when stored together.

4.5 Labelling and decanting

Labelling of chemicals is critical to the safe handling, storage and use of chemicals as it is the first source of information alerting users to the inherent hazards of a chemical. All containers that contain chemicals must be labelled, irrespective of the size of the container (see also section 4.5.1).

A hazardous chemical is correctly labelled if the label is written in English and includes the following information:

- the **product identifier** is a unique name or number by which the chemical is to be known. The product identifier must be the same as that listed in the safety data sheet, and may be identical to the trade name;
- the **name, Australian address and business telephone number** of either the manufacturer or importer;
- the identity and proportion disclosed for each **chemical ingredient**;
- any **hazard pictogram**(s) consistent with the correct classification(s) of the chemical; hazard pictograms reflect the physical, health and environmental hazards of a substance. Where pictograms are required, all the relevant hazard pictograms must be included on the label. There are nine hazard pictograms specified in the GHS.
  - Note: class labels (specified in the ADG7 Code) for the transport of dangerous goods may be used *instead* of hazard pictograms specified in the GHS. **Never** combine GHS and DG pictograms on the same container label. A comparison of the hazard pictograms from the GHS and the ADG7 Code class labels are shown in appendix 4e;
- any hazard statement(s), signal word and precautionary statement(s) that are consistent with the correct classification(s) of the chemical:
  - **hazard statements** describe the *nature* of a hazard, including the degree of hazard (where appropriate). A unique hazard statement is assigned to each hazard class and category. All relevant hazard statements must appear on the label. **Signal words** are used to show the *severity* of a hazard. The GHS uses ‘danger’ and ‘warning’ as signal words. ‘Danger’ is used for a more severe or significant hazard, while ‘warning’ is used for the less severe hazards. Only one signal word should be present on any one label e.g. the signal word ‘danger’ applies, then ‘warning’ should not appear on the label. Signal words should appear in bold and uppercase;
  - **precautionary statements** describe the recommended measures that should be taken to minimise or prevent adverse effects resulting from exposure to, or improper storage or handling of a hazardous chemical. Precautionary statements are assigned to each hazard class and category. Precautionary statements are separated into five categories:
    - ***prevention*** statements refer to precautions to be taken to prevent an accident or exposure;
    - ***response*** statements refer to instructions in case of an accident;
    - ***storage*** statements refer to instructions for safe storage of the chemical;
    - ***disposal*** statements refer to appropriate disposal instructions; and
    - ***general*** statements for use as appropriate.
  - any information about the hazards, first aid and emergency procedures relevant to the chemical, which are not otherwise included in the hazard statement or precautionary statement; and

- the **expiry date** of the chemical, if applicable. The expiry date must be provided where, for example degradation or decomposition of the chemical may occur over time with the result that the hazard classification of the chemical changes, or where the chemical is no longer within acceptable specifications for potency and stability. An expiry date may be provided in a less prominent position of the label, grouped with any manufacturer or importer identification information.

4.5.1 Labelling hazardous chemicals in special situations

A container that has had chemicals decanted into it must be labelled if the contents are not used immediately. The container must be labelled with at least:

- the product identifier;
- the relevant hazard and precautionary statements; and
- hazard pictogram/s consistent with the correct classification of the chemical.

The minimum requirements for labelling chemicals in special situations (e.g. decanted and diluted chemicals) are set out in the *Labelling of Workplace Hazardous Chemicals Code of Practice 2011*. Appendix H of the Code provides examples of appropriate labelling practice.

If possible, include as much hazard information as reasonably practicable in addition to the minimum requirements. Priority should be given to the inclusion of labelling elements relating to the chemical's most significant hazards (i.e. the hazard statements – **the H code numbers need not appear**).

For hazardous chemicals with multiple hazard categories, the most stringent set of precautionary statements should be selected first. This is because rapid action or response may be crucial following accidental exposure. Should any information be omitted due to space limitations, you should add the statement "**refer to safety data sheet before use**" on the label.

The most important aspect of the label is that it must be **legible**. The text, hazard pictograms and other information on a label should be of a size and style that is easily read and is appropriate to the size of the label and container. Table 4.1 provides a guide for the minimum dimensions for hazard pictograms and sizes of text on containers of various capacities.

Table 4.1. Minimum dimensions for hazard pictograms and sizes of text on containers of various capacities.

Container capacity	Minimum hazard pictogram dimensions	Minimum text size
≤ 500 mL	15 x 15 mm	2.5 mm
> 500 mL and ≤ 5 L	20 x 20 mm	3 mm
> 5 L and ≤ 25 L	50 x 50 mm	5 mm
≥ 25 L	100 x 100 mm	7 mm

Source: *Labelling of Workplace Hazardous Chemicals Code of Practice 2011*

If you find a container that does not have a label or is incorrectly labelled, you must take immediate action to correctly label the container. Containers that have had chemicals transferred into them (decanted) in the workplace, and containers of chemical wastes in particular, need to be labelled correctly.

4.6 Storage placarding (signage)

Placards provide a way to alert emergency services to the presence of hazardous chemicals in a workplace and provide information about those chemicals. They are also an important part of an overall safety management strategy for premises storing or handling **dangerous goods** because they:

- identify dangerous goods stored in tanks;
- identify areas where significant quantities of dangerous goods in packages are stored;
- identify the hazards of goods present; and
- indicate the required emergency actions for dangerous goods in tanks through the use of a HAZCHEM Code.

The *WHS Regulation 2011* requires that a workplace must ensure that a placard is prominently displayed at the site if the total quantity of a hazardous chemical, or group of hazardous chemicals stored at the workplace exceeds the placard **threshold quantities** listed in *WHS Regulation 2011* - Schedule 11, column 4 (see, for example, appendix 4f). A workplace that stores quantities that exceed the placard thresholds requires specific

placarding. **Placard requirements** and guidance materials are explained in of the *WHS Regulation 2011* - Schedule 13. Placarding must use ADG7 diamonds to identify storage locations.

If the storage quantities of chemicals **are below the Schedule 11 placard threshold**, then the work site is not required to have any placarding according to the *WHS Regulation 2011*. Nevertheless, from a risk management perspective, it makes sense that the contents of the tank can be identified at a distance by emergency services. It is therefore recommended that any tank, even if its volume falls under the placarding threshold be placarded as a matter of good safety management practice.

It is strongly recommended that workplaces (other than those with large storage facilities) reduce the quantities of stored chemicals to their lowest practicable limits to ensure the site's chemical quantities are below the threshold placarding limits. Placarding thresholds require specific, significant legislative administrative compliance, including detailed emergency plans, that are onerous for a school to undertake and upkeep – so keeping your levels below the specified amounts is important.

If placarding is required, prominent places for placarding include:

- gates or kerbsides where emergency personnel may enter the workplace;
- on gas bottles that are over a certain size (this is managed by the supplier who must also conform to the legislative requirements); or
- next to the entrances of buildings within which threshold quantities of chemicals are stored.

EXAMPLE: LP gas cylinders and placarding requirements:

- LPG is a category 1 flammable gas.
- Schedule 11 states that the placarding threshold for category 1 flammable gases is 200 L.
- Smithtown State High School has 2 x 18 kg cylinder of LPG for both Home Economics and Science, as well as 2 x 9kg cylinders of LPG for its BBQ (used for school events) on site.
- This is a total volume of 220 L (water capacity*) according to table 4.2. This means that Smithtown SHS requires outer warning placarding as the on-site volume exceeds the placarding threshold of 200 L (*WHS Regulation, Schedule 11* requirements).
- The school would then refer to *WHS Regulation 2011 – Schedule 13* to determine what the placarding would look like.
- Placarding would then be posted at every vehicle entrance to the site (i.e. wherever emergency services would enter the site) as required by the *WHS Regulation*.
- If the school was to safely dispose of one 9 L cylinder, it would drop below the placarding threshold and would no longer be required to display placarding.

Table 4.2: LPG cylinder weight conversions to gas volume (AS1596:2008 Appendix C)

Nominal mass of LP gas in cylinder (kg)	Approx. Water capacity* (L)	Nominal mass of LP gas in cylinder (kg)	Approx. Water capacity (L)
3	7	15	36
4.5	11	18	44
9	22	45	108
10	26	90	200
13.5	32	210	499

* gas cylinders are described according to their weight when full of gas (e.g. a 45 kg cylinder). However, the calculation for determining placarding thresholds uses the volume of water a cylinder can hold (water capacity), rather than its weight. Thus, for placarding purposes a 45 kg cylinder can hold approximately 108 L of water.

4.7 Transport of chemicals in private vehicles for work purposes

The transport of chemicals by road and rail is governed by legislation (listed below) which means that DoE employees have specific legal responsibilities they must uphold when using their own vehicle to transport dangerous goods for work purposes. These responsibilities include aspects of stowage (in or on the vehicle), how goods are secured, quantities transported and placarding.

It is DoE's preference that employee's private vehicles **are not** used for the transport of chemicals. In the first instance, every effort should be made to arrange for direct delivery from the supplier. If it is deemed necessary that staff must use their vehicles, principals/managers are to determine and risk manage the following three factors to ensure that staff (e.g. science staff, schools officers and grounds maintenance staff) can safely

transport chemicals, fuel and liquefied gas (LPG, dry ice, liquid nitrogen, medical gases) in their private vehicles:

- transport of dangerous goods requirements;
- workplace health and safety factors in which all foreseeable risks are managed; and
- private vehicle insurance

Staff are to obtain written direction and approval from their manager to transport dangerous goods in their vehicle. This will provide documentation confirming both the work activity and the transport method. Similar to any other work task, should an injury occur during this activity the employee will be afforded protection under the department's worker's compensation policy. Any transport involving dangerous goods should be considered high risk and have an appropriate, approved travel plan.

It is important that all risks (chemical and others such as manual handling) associated with transporting dangerous goods are managed to minimise the potential for injuries or illnesses.

If it is necessary for an employee to transport dangerous goods using their private vehicle it is recommended that the following principles be adhered to:

- less than 25 kg/litres of fuel and/or gas is to be transported in a private vehicle at any time unless there are lesser limits imposed by a vehicle insurance policy (see section 4.7.1);
- the goods are packaged and transported appropriately in containers designed for the particular product e.g. approved fuel containers or tanks, or gas bottles marked with the relevant Australian Standard; and
- loads must be securely restrained. Note that **diesel** is not classified in ADG7 as dangerous goods for transport purposes - there are no regulatory requirements for the transport of small quantities apart from secure load restraint.

If quantities greater than 25 kg/L and less than 500 kg/L are required, it is recommended that delivery from a certified supplier is arranged to enable immediate compliance with legislative requirements without the need for the administrative burden described in sections 4.7- 4.7.2.

Legislative references:

- *Transport Operations (Road Use Management—Dangerous Goods) Regulation 2008*, Part 7 Transport Operations for Particular Dangerous Goods.
- *Australian Dangerous Goods Code of Practice 2017*, Version 7.5 (ADG7) chapter 7.1.

4.7.1 Insurance

Staff who use their private vehicle to undertake official duties are to be paid a motor vehicle allowance (refer to Directive 20/16: Motor Vehicle Allowances for further information). Staff are entitled to claim a kilometric allowance in accordance with this directive and departmental procedures. Staff should obtain written approval from their principal/manager prior to using their private vehicle for work related duties. Before getting this authorisation, staff are to:

- ensure that their vehicle is covered by either a comprehensive motor vehicle insurance policy or a third party property damage insurance policy;
- produce evidence that the insurance policy has been endorsed to indemnify the Queensland Government against certain liabilities at law. This is a standard endorsement available on request from all insurance companies; and
- provide a Certificate of Currency for the motor vehicle insurance policy.

The insurance company may charge a fee to supply this endorsement. Directive 20/16: Motor Vehicle Allowances also states that the department should refund any endorsement fees that might be charged by an insurance company.

Staff are to seek advice from their own insurer regarding the type and amount of cover in their current insurance policies. Each staff member is to confirm whether:

- their policies cover use of their personal vehicle for work purposes;
- the effect an accident would have on any no claim bonus;
- the extent of cover if the vehicle is involved in an incident while being used for work; and
- the extent of cover if fuels being transported explode or burst into flames.

4.7.2 Special provisions for the transport of dangerous goods

As noted above, the Legislation provides a number of options for the transport of small quantities of dangerous goods. The transport of **limited quantities** of chemicals by road and rail is governed by the ADG7 Code Chapter 3.4. This Chapter states that provided that the dangerous goods are packed, labelled, documented and transported in accordance with requirements, the transport of goods in limited quantities is conditionally exempted from some of the more onerous provisions of the ADG7 Code that apply to larger quantities.

With regard to the issue of staff carrying containers of petrol (Class 3) and LPG (UN division 2.1) in their own vehicle for use at the workplace, both the *Transport Operations (Road Use Management—Dangerous Goods) Regulation 2008 (s7)* and *ADG7* permit transport of limited quantities of dangerous goods by a person so that they can be used for a commercial purpose. This only applies if that person is not in the business of transporting dangerous goods or by a person conducting a business.

For hazardous chemicals and dangerous goods, quantities permitted are up to a total amount of:

- 500 kg/L provided there is no Division 2.3 (toxic gas), Division 2.1 (flammable gas –other than aerosols) or Packing group I.
- a total of 250 kg/L applies if any of the above are present provided the aggregate of Division 2.3 plus PG I is less than 100 kg/L. This concession is subject to:
  - packages being safely loaded, secured, segregated, transported and unloaded;
  - dangerous goods being packed and labelled in accordance with the Code with the packaging remaining fit for purpose;
  - more than 250 kg/L of fire risk or toxic dangerous goods (Classes 3, 4, 5, 6) **must not** be transported in a passenger compartment or enclosed space not separated from the passenger compartment; or
  - more than 50 kg/L of Divisions 2.1 and 2.3 plus PG I must not be transported in the passenger compartment or any other enclosed space on the vehicle.

So, in the case of **petrol** (DG Class 3) and **LPG** (DG Class 2.1), the special provision allows for:

- the transport of **less than 500 litres of petrol**, provided it is in approved drums/receptacles that are correctly marked for Class 3 Flammable Liquid and all dangerous goods are securely restrained.
  - If there is any Class 2.1 Flammable Gas on the vehicle (e.g. LPG), the amount of petrol that can be carried is reduced to **less than 250 litres**.
  - **Also**, if the amount of petrol on the vehicle is more than 250 litres, or the amount of LPG is in excess of 50 litres, it must not be transported in the passenger compartment or an enclosed space within the vehicle

4.7.3 Transporting LPG cylinders in enclosed vehicles

Transporting LPG cylinders in enclosed vehicles poses significant risks. Principals and managers are to ensure staff adopt the following requirements:

- For enclosed vehicles a person:
  - must not carry a cylinder of more than 30L (<13.5kg) in size;
  - can only transport 9kg cylinders or larger LPG cylinders for the purposes of getting the cylinder refilled (or exchanged); and
  - transport no more than two 9 kg cylinders at the one time.
- When transporting LPG cylinders make sure:
  - the cylinder is stowed securely in an upright position (so it cannot fall over or become a projectile);
  - the cylinder is placed in the boot/tray rather than the passenger cabin; and
  - the cylinder is protected from excess exposure to sunlight or heat.
- the service valve is turned off;
- the safety relief valve is positioned so that any gas release will not impinge on another cylinder;
- the cylinder has a current test date (no more than 10 years); and
- there is screw plug in, or a cap on the cylinder outlet when not in use.

More information is provided in the safe transportation of LPG cylinders is provided here.

4.7.4 Transporting cryogenic liquids in enclosed vehicles

Transporting cryogenic liquids (e.g. dry ice or liquid nitrogen) in enclosed vehicles poses significant hazards and risks including intense cold or the displacement of air by rapidly evaporating liquid; shocks and bumps to containers may lead to damage to, and failure of the containers, rapid escape of gas and an asphyxiating or explosive atmosphere. It is therefore recommended that containers of liquefied gases only be transported in open vehicles. Principals and managers are to ensure that staff adopt the following requirements:

- use only approved containers designed specifically for the liquefied gas (e.g. Dewar flasks);
- dry ice and liquid nitrogen **must not be** carried inside motor vehicles unless windows are open. This also applies when the item is carried in sedan boots, station wagons, and cabs of trucks and utilities. This prevents the build-up of asphyxiating atmospheres;
- the load is to be carried outside the passenger cab of the vehicle (i.e. it must be secured in the luggage boot, open tray of a utility or in a trailer being towed by a vehicle);
- airtight containers must not be used for storage, as cryogenic liquids will sublimate (even where heavy insulation is provided) and the gas formed will generate a pressure unless it is relieved; and
- the containers should be firmly secured to the vehicle and protected from other objects striking against them during transport. The load is to be restrained so that it will not tip over and spill its contents as a result of normal vehicle operation or an accident.

Workplaces should be conducting risk assessments to ensure that the best practice possible is being used for this activity. For example, consideration of quantities purchased and stowed, vehicle used, securing the load, manual handling of the goods to load and unload etc. The risks may be eliminated by organising for the delivery of fuels/gases/cryogenic chemicals.

4.7.5 Placarding for fuels and LPG while transporting

It is recommended that DoE workplaces arrange for the delivery of all fuels and gases where possible rather than transport them in private vehicles. Section 5.3.1 of ADG7 requires that for loads containing dangerous goods, placards must be attached to the exterior surface of transport units (vehicle and/or trailer) to provide a warning that the contents of the unit are dangerous goods and present risks. Placards are required for:

- Any dangerous goods in a receptacle with a:
  - Capacity > 500 L; or
  - Net mass > 500 kg
- A load that includes ≥ 250 kg(L) with any quantity of:
  - Division 2.1 (except Aerosols); or
  - Division 2.3; or
  - Packing group I of any class or division.

The transport of fuels and gas inside the vehicle fuel tank are exempt from these requirements.

Note that the Legislation and Codes of Practice use the globally harmonised system (GHS) to determine threshold quantities. However, transport requirements still refer to dangerous goods (DG) classes. Thus, you may need to determine the threshold limits according to GHS requirements then convert these GHS threshold quantities to DG classes. You can then determine any DG placarding requirements for transport (see section 14 of the product SDS and appendix 4e for further guidance).

4.8 Specific chemical risk groups

The same safe use, handling and disposal principles are to be adopted for these groups of chemicals (e.g. obtaining SDS, risk assessment where required etc.) however due to how, or where they are used, some additional precautions apply.

4.8.1 Veterinary and agricultural chemicals including pesticides and herbicides

A number of departmental workplaces operate in rural settings and/or undertake a range of tasks using ‘rural’ chemicals. These chemicals may include pesticides, herbicides, fertilisers, fuels and disinfectants. In addition, some activities may produce chemical emissions through work practices such as welding, dusts or exhaust fumes.

Consideration must also be given to the possibility or likelihood of students, neighbours and other members of the public being exposed to these types of chemicals. The timing of these activities should be planned to minimise exposure risks (outside standard school hours is ideal). Effective consultation and communication with key stakeholders will assist in these circumstances. In addition, spray drift and residue levels must be considered and advice about withholding periods must be followed. The following also applies:

- All chemical containers must be labelled to ensure that the contents of the container can be readily identified and used correctly.
  - The use of an agricultural or veterinary chemical from an unlabelled or incorrectly labelled container contravenes the Chemical Usage (Agricultural and Veterinary) Control Act 1988 and the Work Health and Safety Regulation 2011, Schedule 9.
  - A chemical must not be transferred from one container to another (decanted) unless the container to which it is being transferred is a chemical container (never use a food or beverage container) and properly labelled.
- Decanting should be avoided because flammable or toxic vapours may be released in the process and maintaining identification of decanted contents in new containers is difficult (note that some chemicals can react with the container). However, if decanting is carried out, it must be done in a well-ventilated area away from ignition sources into a labelled container (see also labelling section 4.5).
- Unwanted or accumulated chemicals should be disposed of according to the instructions on the safety data sheet, returned to the supplier/manufacturer or through local council rural chemical musters.
- Drums, packages and containers should be returned to the supplier when they are marked 'returnable', or the label specifies return to point of sale. Where empty containers are stored, the lids or bungs must be removed to prevent reuse, and the containers must be secured. Containers should not be burned. Explosions may occur and the smoke and fire present a risk to health. See also disposal (chapter 6).

4.8.1.1 Pesticides

Pesticides are introduced into the environment with the intention of killing, repelling or inhibiting the growth or reproduction of pests, including insects, weeds, rodents, fungi, molluscs (snails) and algae. Pesticides are classified in terms of the type of living organism they are effective against such as insecticides, herbicides, fungicides, rodenticides and algaecides. Pesticides can also be harmful to humans. Before purchasing and applying pesticides, staff are to consider the various options and choose the least hazardous product that will be effective in managing the pest.

Workplaces are encouraged to adopt an environmentally sensitive approach to pest control which aims to prevent unacceptable levels of pest damage by the most economical means, and with the least hazards to people, property and the environment. This is referred to as the Integrated Pest Management (IPM) approach.

It is advisable that workplaces develop an IPM plan which outlines common practices and operational procedures. Schools may also consider developing or ratifying their IPM plan in partnership with their P&C Association to ensure that communication strategies for advising the school community of pest management activities are effective. Pest control records are to be retained for five years (See Retention and disposal schedule for records held in schools).

Workplaces should consider further risk reduction strategies such as:

- Contracting pest management activities out. Contractual arrangements with all pest controllers should include an assessment of health and safety risks associated with the performance of pest control work at the school. This risk assessment must involve consultation with the school. Discussions with pest controllers should involve the following:
  - eradication methods available;
  - written procedure to be followed;
  - areas to be treated (map of spraying/bait locations);
  - the appropriate products for use, including rates of application;
  - follow up action needed (collection time frames if packaged chemicals are used);
  - provision of the SDS for all products before pest control commences;
  - first aid procedures in the event of accidental ingestion or inhalation (refer to SDS); and
  - correct disposal of any waste/contaminated materials or carcasses.
- Appropriate times for application are to be agreed prior to pest control or herbicide spraying activities:

  - use traps or baits that can be laid and taken away in periods when students are not present at the school, for example over the week-end or school holidays; and
  - where there is no follow up visit to retrieve the baits by a pest controller, a process must be implemented by the school to retrieve all baits. This should include the nomination of a person and schedule to collect the baits. The pest controller is to supply information regarding the location of baits, their safe collection and disposal procedures.
- Schools that may have had bait treatments in the past should thoroughly check the school for any baits that may not have been collected from past pest control activities.
- Contact your local council's environmental health officer to discuss appropriate methods to dispose of rodent carcasses.

Suggested control measures to ensure the safe use of baits (e.g. rats and cockroaches) are:

- Keep a written record of numbers of baits laid and recovered
- Place baits and traps in areas inaccessible to children
- Lay on Friday after school and pick up first thing Monday morning
- Use baits with relatively low toxicity
- Follow the directions on the package
- Review the SDS for the bait before treatment commences
- Ensure all baits are retrieved after a reasonable time
- Purchase baits only on an 'as required' basis to eliminate storage
- Maintain good hygiene practice, e.g. washing hands after handling the baits and carcasses.

Other points to consider:

- Swallowing is a likely route of entry into the body for children in a primary school and pre-school environment. Children under school age should be closely supervised when visiting DoE workplaces.
- The design, colour and size of baits could make them attractive to children.
- Because baits are placed in various locations, usually under or behind cupboards they can easily be forgotten or missed when it's time for collection.
- Odours from carcasses can be offensive. Ensure bait locations and carcass disposal are carefully planned.

4.8.1.2 Herbicides

Some departmental workplaces may be required to comply with specific requirements of legislation for the distribution of herbicides when controlling weeds. Licencing is dependent on location within certain defined hazard zones in Queensland, as well as the method of herbicide application. Licencing is required because some herbicides have the potential to adversely affect local crops. Licencing is achieved through the completion of prescribed training.

Distribution permits are also required for some applications. You will need to contact the Organisational safety and wellbeing unit if a permit is required since the permits for hazardous areas are issued to the employer (i.e. DoE) who holds the ground distribution *contractor licence*, not the individual employee that holds the *commercial operator licence*. Permits are not easily obtained and it is VERY strongly encouraged avoiding the use of any restricted herbicide in the hazardous areas.

If you are in one of these **regulated hazardous zones** you will need a licence:

- Hazardous area no. 1: Moreton Bay Regional Council and Sunshine Coast Regional Council;
- Hazardous area no. 2: broadly, this area consists of the Darling Downs and adjacent areas; and
- Hazardous area no. 3: broadly, this area consists of a substantial area surrounding Emerald.

To find your precise workplace location within the three **regulated hazardous** zones, go to the atlas containing a map detailing their locations. You can use your street address or your workplace's cadastral details (e.g. lot number) from your site building plans or local council.

This map also details the locations of:

- **regulated** areas – that is, where the *Agricultural Chemicals Distribution Control Act 1966* (ACDC Act) applies; and
- **excluded or non-regulated areas –** where the ACDC Act **does not** apply.

Once your location is displayed on the map, click on the info icon on the top right of the screen, then (single) left click on your map location to allow the hazardous zone to be displayed.

Refer to the flowchart in Appendix 4g for a summary of the ACDC licensing process.

Further details about compliance zones and training is available through Queensland Government's Business and Industry portal here.

Records are to be kept on all aspects related to the application, assessment and control of the risks from the storage and application of herbicides. Biosecurity Queensland requires that records of each and every ground distribution carried out are made and kept for at least two years. However, because of the nature of DoE environments, DoE requires that any records related to herbicide application are to be kept for at least five years. Records should include:

- information on the products including a list of chemicals, labels and SDS, any emergency procedure guides (EPGs) and safe storage guides;
- risk assessment outcomes and actions including training programs for emergencies, use, application and the wearing of protective equipment; and
- details of application procedures.

The Rural Chemicals Guide 2010 also provides further advice on how to comply with the relevant rural chemical legislation.

4.8.2 Scheduled poisons

Some chemicals, specifically drugs and poisons, are regulated. Poisons are categorised into schedules – the higher the number of the schedule, the higher risk of harm to humans. The *Standard for the Uniform Scheduling of Medicines and Poisons* lists chemicals under nine schedules based on their potential for causing harm. Of particular importance to DoE workplaces are schedules five, six and seven chemicals. DoE workplaces should refer to appendix 4b for information on restrictions when using scheduled poisons.

Legislation has requirements relating to the storage of schedule five, six and seven poisons to ensure that they are kept well away from the reach of children. Storage of these substances should be in a location which is to be kept locked with a childproof latch fitted to minimise the risk of:

- accidental or unauthorised access to the storage area; and
- adverse health impacts for children and visitors not familiar with the hazards of chemicals.
- Scheduled poisons must never be stored in food or drink containers.

S5 poisons are designated as **caution – low potential for harm**, and are known as domestic poisons. They include kerosene, some solvents, dishwasher detergent, swimming pool chemicals (chlorine), and a number of agricultural chemicals. S5 poisons:

- have low toxicity or a low concentration;
- have a low to moderate hazard;
- can cause minor adverse effects to humans under normal use; and
- require caution in handling, storage, or use.

S6 poisons have a **moderate potential for harm** and include a number of agricultural chemicals, industrial chemicals, solvents and insecticides. They are substances and preparations:

- with moderate to high toxicity; and
- which may cause death or severe injury if ingested, inhaled, or in contact with skin or eyes.

S7 dangerous poisons have a high potential for harm. S7 poisons include some of the more hazardous agricultural and industrial chemicals. They are substances and preparations that:

- have high to extremely high toxicity;
- can cause death or severe injury at low exposures;
- require special precautions in their manufacture, handling, or use;
- may require special regulations restricting their availability, possession or use; and
- **are too hazardous for domestic use or use by untrained persons**.

Health regulations restrict public access to S7 products and workplaces may be required to complete an end user declaration (EUD) as part of the purchase process.

In addition to scheduled poisons, unscheduled poisons/medicines should not be used or brought in to schools unless they are prescribed medicines and are used according to the Administration of medications in schools procedure.

Further to this, the use of unscheduled or unused prescription medications used for other purposes (e.g. science experiments) is strongly discouraged (e.g. *Health (Drugs and Poisons) Regulation 1996*, s286). Schools are asked to consider the purchase of approved alternative products rather than use antibiotics from personal prescriptions. Instead, consider purchasing off-the-shelf products (e.g. mastrings, antacids, vitamins) to undertake the same experiment to ensure risks are more strongly controlled (e.g. drug security, foreseeable misuse, accidental poisoning, allergic reaction).

The use of students as test subjects in student experiments where the ingestion of any foods, drinks or medications is strongly discouraged as these projects have miniscule research merit when compared to the potential risks they present (National Statement on Ethical Conduct in Human Research 2007).

4.8.3 Laboratory reagents

Laboratories use numerous hazardous chemicals (e.g. corrosives, flammables, reactive substances and radioactive materials), biological agents (microbes, animals, plants, and genetically modified agents) and scheduled poisons that pose potential hazards to workers, students and others.

While these chemicals may be beneficially used in laboratories, they may also have the capacity to cause inadvertent harm to users or bystanders exposed to them. Nearly every common laboratory technique, practice or procedure carries some risk of exposure as there are many possible exposure sources to consider (e.g. fumes, splashing, sharps, reactive substances, storage failure). Workers and students are to implement good laboratory practice when storing, handling, mixing, decanting and disposing of chemicals to minimise the risk of exposure; including:

- Make sure you know how to interpret the safety data sheet information in regard to health hazards, flammability, reactivity, handling, storage and disposal. Check for exposure levels, flash point, spill clean-up and firefighting media.
- Safe practice demands an awareness of your surroundings. Be alert to unsafe conditions or actions in the laboratory. Call attention to them and make corrections.
- Be familiar with your location's emergency procedures and the evacuation plan and practice its implementation. Keep passageways and exits clear of obstructions.
- Ensure adequate ventilation to prevent fume/odour build up.
- Know how to use laboratory safety equipment and the exact positions of safety equipment e.g. shower, eye wash station, personal protective equipment, fume hood, fire alarm, fire extinguisher, first aid kits and spill clean-up materials.
- Be aware of static, sparking and ignition sources, open flames, heat and electrical equipment.
- Ensure that the possession and use of radioactive substances complies with the legislative requirements outlined in the Radioactive substances used for science activities fact sheet.
- Be familiar with the properties of biological materials used for curriculum activities (e.g. toxic or hallucinogenic plant material, animal venoms, parasites, insect stings, asthma and food allergy triggers). Refer to the Infection control guidelines for standard precautions for infection control when handling body fluids (e.g. DNA, saliva). The use of human blood products in curriculum activities is not permitted. If animal blood is used, it must be obtained from a verified non-infectious source (e.g. a science supply company).

The educational benefit of particular practical demonstrations that involve strong oxidation reactions (e.g. 'smoke bombs') and combustion reactions (e.g. hydrogen balloon, thermite reaction, sulfur combustion) are to be carefully weighed against their risk. Very tight controls are required to eliminate any potential of personal injury or damage to property. The Explosives Act 1999 s38 (2)(a) requires that no more than 100g of explosive material is generated/used by a *competent and authorised* person. Reactions using perchlorates are not permitted (appendix 4b).

Further to this, undertaking reactions in enclosed or sealed vessels where there is the possibility of rapid reactions or combustion, or the generation, expansion or sublimation of gas is not permitted (e.g. dry ice bottle reaction). The use of enclosed vessels in this manner is classed as an improvised explosive device since there is no control once this device is assembled. This type of demonstration creates an unacceptable risk to both students and teachers.

4.8.4 Swimming pool chemicals

Many pool chemicals are hazardous as they may be combustible, oxidizing, water-reactive, toxic or corrosive. They can seriously harm people, property and the environment. When managing pool chemicals in DoE workplaces, careful attention must be paid to the following:

- quality of tank installations for bulk storage of hypochlorite solution;
- maintaining the stability and safe storage of packaged liquid and dry dangerous goods;
    - placarding requirements;
- controlling chemical dispensing activities; and
- training and safety equipment for safely handling chemicals.

DoE workplaces should access School swimming pools – operation and management which will assist in identifying responsibilities and strategies regarding the maintenance and operation of swimming and hydrotherapy pools to support a safe and healthy pool environment and optimal service delivery. Workplaces are also encouraged to review A guide for pool chemical retailers. This guide provides clear direction on appropriate risk control measures to assist with their pool chemical management and is published by Workplace Health and Safety Queensland.

4.8.5 Dust

Dust can be defined as tiny particulates of material produced during the processing and preparation of materials. In departmental workplaces, there are many different types of dust formed from soils, metal, synthetic fibres (e.g. fibreglass), ceramic art materials, textiles and work processes (sanding, machining and cleaning). These dusts can be created by a wide range of curriculum and maintenance activities performed by students and staff.

Departmental workplaces such as schools may not have identified the potential health effects associated with some of these processes. In particular, the processing of timbers and the volumes of resultant wood dust in industrial technology and design, creative arts, and facilities and maintenance areas pose the majority of health concerns.

Schools should note that the use of oleander (also known as rose laurel; *Nerium oleander*) and western red cedar (*Thuja plicataen*) timbers in industrial technology and design settings applications are prohibited due to the highly toxic (oleander) and carcinogenic (cedar) properties of the dust generated from these timbers. Further information on timber dust hazards is available from the ITD guideline - a practical handbook for ITD activities.

Appendix 4a – chemical safety pre-purchase checklist

Before purchasing a chemical substance, the requestor and/or purchaser is encouraged to read and research the appropriate safety data sheet to determine whether the substance can be safely stored, handled, used and disposed of; and is safe to use with students or within the educational environment.

Pre-purchase health, safety and environmental considerations	**Y**	**N**	**N/A**	**Comments** **(what controls/ requirements will be put in place/ provided prior to purchase. Are alternatives/ substitutes available)?**
Is the chemical essential? (Is it the right product for the purpose intended? Can it be substituted by a less hazardous product)?				
Is a current safety data sheet (SDS) supplied/available (less than five years old)? Have you read the SDS?				
Have the stock manifests across the work location been checked for duplication or excess				
Will the chemical be brought onto campus from home? If so, refer to 'Bringing Substances into DoE Workplaces'.				
Does the substance appear on the department's prohibited chemical list? Does it contain prohibited ingredients?				If yes, do not purchase.
Is suitable storage available?				
• Dangerous goods storage				
• General chemical storage				
• Biological storage				
• Cold storage				
• Poisons and drugs storage				
• Gas cylinder storage				
• Bunding				
Is the product an identified:				
• Carcinogen				
• Mutagen				
• Teratogen				
• Acutely toxic				
• Chronically toxic				
• Sensitiser				
• Asphyxiant				
• Radioactive source				
• Poison				
Is an end user declaration required?				

Are staff competent/trained to use the substance?				
Are appropriate facilities/ equipment available for the storage and use of the substance? Are additional purchases required?				
Are suitable PPE, first aid, emergency and spill procedures and equipment available?				
What is the method of disposal?				
Is there a cost associated with disposal? Has this funding been allocated?				
Responsibility for documentation of post purchase risk assessment has been designated.	Responsible officer			Completion date (prior to first use)
Approvals: Requisitioner: (Print name)	Date:			Signature
Supervisor/purchasing officer: (Print name)	Date:			Signature

Chemical safety post-purchase checklist

On receipt of goods, workplaces are encouraged to complete this checklist to ensure chemicals are safely managed.

Post-purchase checklist	**Y**	**N**	**N/A**	**Comments** (what controls/ requirements are needed prior to use. Are there further requirements before the substance is used?
Has the supplier provided all safety information/ has a vendor SDS been obtained from ChemWATCH?				
Is the substance appropriately labelled and packaged? (see Guideline for managing risks with chemicals in DoE workplaces.)				
Has the chemical stock manifest been updated?				
Have any hazardous substances been added to the register of hazardous substances?				
Are there any changes to site placarding requirements?				
Has a risk assessment been prepared?				
Has a safe operating procedure been written? (This may be included with the risk assessment)				
Have the identified risk controls been implemented? (see the pre-purchase checklist)				
Has training been provided that covers handling, storage, use and disposal?				
Has the substance been stored appropriately?				

See the WHSQ Compatibility and segregation chart for further guidance.				
Have the appropriate personnel been advised that the substance is available?				
Person completing checklist: (print name)				Position:
Signature				Date

Appendix 4b – prohibited chemicals and high risk substances in departmental workplaces

A number of chemicals are banned from purchase and use in departmental workplaces because of their inherent risks to staff, students and others. The prohibited chemicals are listed by occupation or student groups. Staff should also consult the *WHS Regulation 2011* – Schedule 10 for a list of prohibited carcinogens, restricted carcinogens and restricted hazardous chemicals.

Prohibited – all staff

- Asbestos containing materials; and
- CCA treated timber.

Prohibited – schools officers (EQ schools)

The following chemicals have been prohibited for use by schools officers in Education Queensland schools for pest management. There are alternative, effective and less hazardous substances that can be used as herbicides and pesticides that pose lesser health and environmental risks and do not necessitate health monitoring as required by the *WHS Regulation 2011*.

- Schedule six poisons*
- Schedule seven poisons*
- Organophosphate pesticides (e.g. Chlorpyrifos, Malathion)
- Creosote
- 2,4-D based herbicides

Refer to the product SDS (section 3) to identify organophosphate and 2,4-D ingredients before purchasing herbicides, pesticides, insecticides and fungicides.

*Poisons are categorised into schedules - the higher the number of the schedule, the higher risk of harm to humans. **Schedule six** (S6) poisons have distinctive packaging and have a clear warning of poison along with safety directions on the product label. These substances must be kept out of reach of children. These poisons have potential for causing harm to humans.

***Schedule seven** (S7) poisons are substances that have a high potential for causing harm to humans and includes strychnine, cyanide and hazardous agricultural and veterinary chemicals. They have a clear warning of dangerous poison on the label. These substances must also be kept out of reach of children. S7 poisons are listed in the Health (Drugs and Poisons) Regulation 1996 (Qld) - Appendix 7 (p283)

Schools officers are permitted to use S6 and S7 poisons (such as pool chemicals) as long as they are not prescribed for use as pesticides, insecticides, fungicides OR herbicides.

Prohibited – cleaners (EQ Schools)

- Bleach (this includes all derivatives of bleach products and all brands). Note however that bleach may be used when specifically directed by a supervisor for hygiene purposes.

School Cleaners must only use chemicals listed on the preferred supplier agreement provided by the department. If an employee has a requirement to purchase a chemical that is not on the preferred supplier agreement list or already approved for use, the worksite must obtain approval from their principal/manager or their delegate. The checklist for *Bringing Chemicals into DoE workplaces* found in the Guideline for Managing Risks with Chemicals in DoE Workplaces can be used for this approval process prior to the substance being introduced to the worksite. All recommendations in this document are to be implemented prior to bringing the chemicals onto campus. Once approved, the person responsible for managing the chemicals on campus is to be advised so that they may assist with the safe storage, labelling and handling of the product, and ensure that the appropriate risk management tools are recorded and implemented.

Prohibited – staff and students (EQ Schools)

- Potassium chlorate (potentially explosive)
- Benzene
- Carbon tetrachloride

High risk substances with uncertain or unpredictable risk levels

A number of other chemical substances pose potentially major health and physical risks. Departmental workplaces should consider very carefully whether the curriculum/industry relevance of experiments, demonstrations, cleaning, maintenance and/or agricultural/horticultural activities involving these substances is sufficient to warrant their being stocked. In such cases, minimum quantities should be obtained, stored and used. Such substances include but are not limited to:

- heavy metals and the salts of heavy metals;
- very strong oxidising (e.g. nitric acid, nitrates), reducing (chlorides) and toxic agents;
- caustic/corrosive (very strong acids, hydroxides) chemicals;
- extremely flammable or volatile, explosive, carcinogenic and halogenic chemicals;
- substances subject to hazardous decomposition;
- environmental toxins (e.g. agricultural chemicals); and
- substances and materials that may be diverted for illicit drug illicit manufacture and security sensitive chemicals (SSANs)

While not a comprehensive listing, specific examples of these substances are listed in Table 1 below.

The chemical's SDS, *WHS Regulation 2011 Schedule 14* and *Chemical safety pre-purchase checklist* are useful resources to gain an overview of indicative hazards for substances. The potential risk posed by chemicals should always be considered through a documented risk management process before they are introduced into the workplace.

References:

Australian Government (Department of Health) National Industrial Chemicals Notification and Assessment Scheme. 2013.

Table 1: High risk substances with uncertain or unpredictable risk levels

These chemicals present an unpredictable or uncertain risk in relation to worker health and safety, storage and handling in DoE workplaces or may be considered too dangerous for use by students and inexperienced personnel. They must be stored and handled according to the information provided in the safety data sheet and only used by very experienced and competent workers. It is recommended that these substances are eliminated from the workplace by substituting with less reactive, less toxic and more stable compounds. This list is by no means exhaustive. However, it does cover some of the more common chemicals used.

All chemical users are reminded that the risks associated with chemical use in DoE workplaces must be assessed to ensure that chemical risks do not outweigh the occupational and/or educational outcome for an activity.

Chemical	Characteristics
Acrylonitrile	Restricted carcinogen. Any use requires permission for use by the Regulator (*WHS Reg 2011 S380-384, Schedule 10*).
Alkaline metals- Potassium, sodium, calcium, lithium	React violently with water to form hydrogen which ignites or explodes. Highly flammable.
Ammonium chlorate	Violently explosive.
Ammonium perchlorate	Violently explosive, highly reactive.
Aniline, phenylamine	Extremely toxic, carcinogenic.
Arsenic compounds	Extremely toxic, carcinogenic.
Beryllium salts	Highly toxic and carcinogenic.
Bromine	Highly corrosive, oxidiser, volatile liquid, poison fumes.
Carbon disulphide	Very low flash point, extremely flammable, highly volatile, very toxic. Use for spray painting requires permission from the Regulator (*WHS Reg 2011 S380-384, Schedule 10*).
Cadmium compounds	Highly toxic heavy metal, carcinogen, some compounds are very strong oxidisers.
Chlorates (all)	Dangerous explosion risk. Explosive mixtures easily formed.
Chromic acid, chromium (VI) oxide, chromium trioxide, chromic anhydride, Red zinc chromate, inorganic chromates/ dichromates	Highly toxic and corrosive, poison. Hexavalent compounds are known to be carcinogenic. Powerful oxidizers.

Chemical	Characteristics
Cyanide containing compounds	Extremely poisonous, with acids forms toxic and poisonous hydrogen cyanide gas.
Diethyl ether	Low flash point, extremely flammable, peroxide former (explosion risk).
Ethylene Dichloride	May cause cancer, low flash point, extremely flammable, may form explosive compounds.
Ethylene Oxide	May cause cancer, low flash point, extremely flammable, extremely toxic.
Epoxy Resins (Uncured)	Toxic, respiratory and skin sensitiser, possibly carcinogenic.
Ethylene dibromide	Restricted carcinogen. When used as a fumigant or genuine research or analysis requires permission for use by the Regulator *WHS Reg 2011* s380-384, Schedule 10. Residues may be found in wood dust.
Fluoride compounds	Can evolve hydrofluoric acid if acidified, all are highly toxic and poisonous.
Formaldehyde	Toxic, carcinogen, severe sensitiser, skin irritant.
Gun wash (liquid hydrocarbons)	Highly flammable, possibly carcinogenic, toxic
Halogenated solvents (e.g. carbon tetrachloride, chloroform, trichloromethane, trichloroethane)	Extremely toxic and suspected carcinogens, bio accumulative pollutants
Hardite	Extremely toxic, carcinogenic.
Hydrofluoric acid	Extremely toxic. Very dangerous.
Inorganic lead and lead compounds including, metal, acetates, carbonates, nitrate, sulphides, paints, and solders	Highly toxic, cumulative effects from prolonged exposure, poison, some lead products may cause cancer.
MEKP (methyl ethyl ketone peroxide)	Shock sensitive, special storage and use requirements. Experienced users only.
Mercury compounds	Highly toxic.
Methylene chloride	Possible carcinogen, highly toxic.
Methyl iodide	Extremely toxic, may form explosive compounds.
Millon's reagent (mercury + nitric acid)	Highly corrosive, highly poisonous.
Naphthalene compounds	Highly toxic, carcinogenic impurities.
Nickel and nickel compounds	Possible carcinogen, toxic, sensitiser.
PCBs, polychlorinated biphenyls	Moderately toxic, probably carcinogenic.
Perchloric acid	Powerful oxidiser, highly corrosive, violently explosive mixtures with combustible materials and metals.
Phosphorus, white, white phosphorus, yellow phosphorus, red phosphorous	Extremely toxic- emits poisonous gas which can be fatal, ignites spontaneously in air, extreme fire hazard.
Picric acid	Explosive when dry and compacted or in contact with metals.
Potassium cyanide	Extremely poisonous. Releases poison gas when even slightly acidified.
Sodium amide, sodamide	Highly toxic, flammable, reacts violently with water.
Sodium azide	Extremely toxic, poison, explosive reaction with metals.
Sodium dithionite	Toxic by ingestion and inhalation. Allergen. Powerful reducing agent.
Sulphur dioxide (gas generator or gas cylinder)	Poison gas at high levels. Corrosive irritant to eyes and skin.
Toluene	Highly flammable, highly toxic, possible carcinogen.
Tolidine	Highly toxic, carcinogen.
Trichloroethylene	Highly toxic, carcinogen, may form explosive compounds.
Vinyl Chloride	Restricted carcinogen. Any use requires permission for use by the Regulator *WHS Reg 2011 S380-384, Schedule 10*.
Xylene	Toxic.
Zinc Chloride	Corrosive, very toxic to the environment, possible mutagen.

Appendix 4c – bringing chemicals into DoE workplaces

Chemical users who wish to introduce new chemicals into DoE workplaces obtained through donations, for a one-off purchase or for special use are encouraged to use this form. Completing this form will assist to control the introduction of unauthorised chemicals into DoE workplaces, manage exposure to risks and ensure safe practices are implemented.

Chemical users should refer to the *Guideline for Managing risks with chemicals in DoE workplaces* before introducing new substances into the workplace. The chemical's Safety Data Sheet (SDS) **and** a completed risk assessment are to be attached to this application. Please use the information on the SDS to complete the details below.

Name of person requesting chemical authorisation					
Position					
Product name of substance					
Common name of chemical					
Reason for introducing chemical					
SDS attached	☐ Yes	Review date		Risk assessment attached	☐ Yes
Supplier details					
GHS or DG division		Pkg group		Amount (L/kg)	
GHS or DG Hazard Classification				Hazchem code	
Physical appearance of chemical (powder, liquid etc.)					
Proposed storage location					
Disposal method					

Approval (print name)	Name: Position:	Signature	
Chemical Manifest updated	☐ Yes	Responsible officer	
Hazardous Chemical Register updated	☐ Yes ☐ N/A	Responsible officer	

Note that approval of new chemicals is not guaranteed and it may take some time for staff to address issues such as chemical compatibility, handling and storage requirements, waste disposal and any control measures identified in the risk assessment. Personnel should refrain from obtaining chemicals until approval is granted.

If your chemical is approved for use, your supervisor or person who co-ordinates chemical management in your workplace will show you where to properly store the chemical and advise you of relevant management practices. When storing the chemical, the bottle must have a compliant label with the addition of the user name and the date the chemical was brought into the workplace.

Appendix 4d – chemical segregation advisory guide

The following table gives a brief overview of possible combinations of dangerous goods classes which may be stored together. A comprehensive Compatibility and segregation chart may be accessed here.

Dangerous goods compatibility chart

	2.1	2.2	3	4.1	4.2	4.3	5.1	5.2	6	8
2.1	OK	SEPARATE	SEGREGATE	SEGREGATE	SEGREGATE	SEGREGATE	SEGREGATE	ISOLATE	SEPARATE	SEPARATE
2.2	SEPARATE	OK	SEPARATE	REFER TO SDS	SEGREGATE	REFER TO SDS	REFER TO SDS	SEGREGATE	REFER TO SDS	SEPARATE
3	SEGREGATE	SEPARATE	OK	SEPARATE	SEGREGATE	SEGREGATE	SEGREGATE	ISOLATE	SEPARATE	SEPARATE
4.1	SEGREGATE	REFER TO SDS	SEPARATE	OK	SEPARATE	SEGREGATE	SEGREGATE	SEGREGATE	SEPARATE	REFER TO SDS
4.2	SEGREGATE	SEGREGATE	SEGREGATE	SEPARATE	OK	SEPARATE	SEGREGATE	ISOLATE	SEPARATE	SEPARATE
4.3	SEGREGATE	REFER TO SDS	SEGREGATE	SEGREGATE	SEPARATE	OK	SEPARATE	SEGREGATE	REFER TO SDS	REFER TO SDS
5.1	SEGREGATE	REFER TO SDS	SEGREGATE	SEGREGATE	SEGREGATE	SEPARATE	*	SEGREGATE	SEPARATE	SEPARATE
5.2	ISOLATE	SEGREGATE	ISOLATE	SEGREGATE	ISOLATE	SEGREGATE	SEGREGATE	OK	SEPARATE	SEPARATE
6	SEPARATE	REFER TO SDS	SEPARATE	SEPARATE	SEPARATE	REFER TO SDS	SEPARATE	SEPARATE	OK	REFER TO SDS
8	SEPARATE	SEPARATE	SEPARATE	REFER TO SDS	SEPARATE	REFER TO SDS	SEPARATE	SEPARATE	REFER TO SDS	*

Key

OK	Dangerous goods of the same class should be compatible. Refer to the SDS or supplier for requirements for individual chemicals.
*	Dangerous goods of the same class could be incompatible or react dangerously. Consult the SDS or supplier for requirements for individual chemicals.
REFER TO SDS	Segregation of these classes may be necessary. Refer to the SDS or supplier for information.
SEPARATE	Dangerous goods of these classes should be kept apart by at least 3m. Refer to the SDS or supplier for information.
SEGREGATE	These combinations of dangerous goods should be segregated by at least 5m and kept in separate compounds or building compartments.
ISOLATE	This requirement applies to organic peroxides for which dedicated storage cabinets are recommended. Adequate separation from other buildings and boundaries is required.

Dangerous goods classes

Class 2 COMPRESSED GASES
- Class 2.1 Flammable
- Class 2.2 Non-flammable/non-toxic compressed gas

Class 3 FLAMMABLE LIQUIDS (and combustible liquids)

Class 4 FLAMMABLE SOLIDS
- Class 4.1 Flammable solids
- Class 4.2 Spontaneously combustible

Class 4.3 Dangerous when wet

Class 5 OXIDISING SUBSTANCES
- Class 5.1 Oxidising agents
- Class 5.2 Organic peroxides

Class 6 TOXIC SUBSTANCES

CLASS 8 CORROSIVE SUBSTANCES

Notes:

1. In all cases the SDS or supplier of goods should be consulted.
2. The segregation of dangerous goods of division 1.4 may be required. Consult the SDS or supplier of the goods.
3. Combustible liquids shall be segregated in the same manner as flammable liquids of Class 3.
4. Dangerous goods of Class 9 should be segregated in accordance with the SDS.
5. If the dangerous goods have a Sub risk of another class, then the segregation requirements for the Sub risk need to be determined and the more stringent segregation requirements applied.
6. Where smoke detectors are to be stored, the supplier should be consulted and any specific storage and handling recommendations followed.
7. The guidance in this segregation tool may not practical for the storage of small quantities of incompatible goods in retail consumer packages or laboratory reagents. For small packages goods may be stored apart on shelving on physical barriers or in separate storage cabinets as long as incompatible goods are not stored above one another or in such a way that allows them to come into contact.
8. Class 8 consists of acids and alkalis which are often incompatible and may react violently and give off toxic, corrosive gases. The SDS should be consulted. It should **not** be assumed that Class 8 goods are compatible.

Source: Modified from Australian/New Zealand Standard AS/NZS 3833:2007- The Storage and Handling of Mixed Classes of Dangerous Goods in Packages and Intermediate Bulk Containers, Figure 6.1, pp44-46.

Appendix 4e – GHS and dangerous goods classification of chemical substances

Dangerous goods (DG) describe chemicals that present a risk either through their physicochemical hazards, acute toxicity or hazards to the environment. These chemicals are classified into nine categories according to the predominant type of hazard. Whilst the DG classification remains relevant for the transport, storage and placarding of chemicals, the *WHS Regulations 2011* now refers to hazard classes and categories in accordance with the *Global Harmonisation of Chemical Classification and Labelling (GHS)*. The *Dangerous Goods Safety Management Act 2001* is now repealed, and covered in the *WHS Regulation 2011*.

The *GHS* specifies nine pictograms that are representative of the physical, health and/or environmental hazards of a particular substance. The *GHS* pictograms are a key hazard communication tool designed to appear on chemical labels. The purpose of the pictograms is to convey information about the type, severity and management of chemical hazards.

A comparison of substances under the *GHS* classifications with those under the *Australian Dangerous Goods (ADG) Code* is provided below to assist with the DG-GHS transition. Note that the DG diamonds for miscellaneous dangerous goods (DG Class 9), radioactive substances (DG Class 7) and infectious substances (DG Class 6) are not covered within the scope of workplace hazardous chemicals requirements. Workers using these substances should ensure that they are labelled according to the *WHS Regulations 2011*.

GHS hazard pictogram	GHS hazard category	Dangerous goods class pictograms	Dangerous goods classes
	• Explosives • Self-reactives • Organic peroxides		Explosive.
	• Flammables • Self-reactives • Pyrophorics • Self-heating • Emits flammable gas in contact with water • Organic peroxides		• Flammability (liquid, solid or gas) • Pyrophoric • Emits flammable gas • Organic peroxide
	• Oxidisers		• Oxidiser • Oxidising gas
	• Gases under pressure		• Non-toxic non-flammable gas • Flammable gas • Oxidising gas • Toxic gas

GHS hazard pictogram	GHS hazard category	Dangerous goods class pictograms	Dangerous goods classes
			
	• Acute toxicity		• Acute toxicity • Acute toxic gas
	• Acute toxicity • Skin irritants • Eye irritants • Skin sensitisers	No equivalent	
	• Carcinogens • Respiratory sensitisers • Reproductive toxicants • Target organ toxicants • Germ cell mutagens	No equivalent	
	• Eye corrosion • Skin corrosion • Corrosive to metal		• Corrosive to metals
	• Aquatic toxicity. • Not covered within the scope of workplace hazardous chemicals requirements		• Environmental hazard
No equivalent hazard pictogram			• Miscellaneous dangerous goods
Not covered within the scope of workplace hazardous chemicals requirements			• Infectious
Not covered within the scope of workplace hazardous chemicals requirements			Radioactive

Source: Workplace Health and Safety Queensland (2012). Labelling of Workplace Hazardous Chemicals Code of Practice 2011, Appendix G-Comparison of hazard pictograms with ADG Code class labels. Department of Justice and Attorney-General, Queensland.

Appendix 4f – placarding thresholds for manifest quantities

Placards are an important part of an overall safety management strategy for premises storing or handling dangerous goods. They provide a way to alert workers and emergency services to the presence of hazardous chemicals in a workplace and provide information about those chemicals.

Placarding is legally required at a workplace when the quantities of hazardous chemicals on site exceed any of the thresholds placarding quantities listed in column 4 of schedule 11 of the regulation. Table 4f.1 shows examples of placarding quantities of some common chemicals used in DoE workplaces. In accordance with these requirements, department workplaces (including schools) can keep up to the prescribed amounts of hazardous chemicals listed in the table below on the premises before they are required to placard (sign) their site (schedule 11, column 4). Specific information for hazardous chemicals can be sourced from schedule 11(WHS Regulation, p647)

The placarding must be compliant with WHS Regulation 2011 – schedule 13 (p657). Where the WHS Regulations (Schedule 13) require a placard, the relevant dangerous goods class diamond must be displayed on the placard, rather than the corresponding GHS pictogram.

In addition to the placarding requirements of WHS Regulation schedule 11, the principal/manager of the workplace *must* ensure that Workplace Health and Safety Queensland is given written notice on the appropriate form if a departmental workplace uses, handles or stores chemicals in quantities that exceed the manifest threshold quantities listed in schedule 11, column 5.

Determining workplace placarding requirements

Step 1 – conduct a survey of all chemicals at the workplace

This step can be done at the same time as the survey of chemicals during the stock taking and risk assessment process. Record these chemicals in your chemical manifest.

Step 2 – determine their GHS hazard classifications

Refer to the SDS and chemical container labels for information on whether the chemical has a hazardous classification. The classification is usually depicted by a red diamond symbol and written descriptor. You will need to convert the GHS classifications to dangerous goods (DG) classifications. The following references may assist with this:

- Placard and manifest quantities: GHS categories with ADG Code equivalents
- Section 14 of the product SDS

Step 3 – determine compliance with storage thresholds

Total all surveyed quantities of dangerous goods within each classification and compare to the threshold limits in *WHS Regulation Schedule 11*. If the stored quantities do not exceed the placard limits, the workplace is considered to be a minor storage location and is not subject to any further legislative requirements under the WHS Regulation 2011.

If a threshold limit is exceeded, the workplace must placard according to *WHS Regulation* - schedule 13 requirements. Common examples of thresholds being exceeded would include fuel, combustible liquid, LPG and pool chlorine storage (e.g. see table 4f.1).

The workplace should consider reducing the volumes of chemicals stored so that the legislated placarding or storage notification requirements of the *WHS Regulation 2011* are not applicable.

Step 4 – minimise the quantities of goods stored

The management of these chemicals should be discussed with the supplier to ensure that operations are not put at risk by reducing the quantities of chemicals on site.

Step 5 – conduct a risk assessment

Ensure a risk assessment has been conducted for all dangerous goods stored at the location. Refer to Chapter 5 of this guideline for further information on conducting risk assessments.

Step 6 – contact authorities for further advice

If a DoE workplace exceeds placarding quantities or is unsure about the application of the thresholds, the workplace should contact their workplace Health and safety advisor or Regional/institute health and safety consultant for more information about the implementation of the minimum requirements.

If the quantities of chemicals stored at a site exceed the thresholds WHS Regulation 2011 – schedule 11 column 5, the workplace is considered to be a manifest quantity workplace (MQW) under the WHS Regulation. The workplace must advise the regulator and will require specific placarding in accordance with *WHS Regulation 2011* - schedule 13. MQWs are recognised by the WHS Regulation as workplaces where relatively large quantities of hazardous chemicals are used, stored and handled such that additional safety obligations are applied.

Step 7 – placarding (signage)

Schedule 13 of the Work health and safety regulation provides specific details for placarding. Schedule 13 will assist you to determine requirements for:

- displaying placarding (building (inner placards) and site entry (outer warning placard);
- bulk storage placarding (e.g. tanks);
- schedule 11 chemicals, specific flammable and combustible liquids; and
- maintaining placards.

Further assistance can be obtained from the Hazardous Industries and Chemicals Branch, Department of Justice and Attorney-General via the info line 1300 369 915, or by email: hicb@justice.qld.gov.au.

Appendix 4g – how to decide if you need an ACDC licence.

A regulated licencing and permit system is in place in Queensland to ensure the ground distribution of herbicides is undertaken responsibly. Licence requirements are determined by location and method of distribution. You can obtain a licence in one of two ways. Biosecurity recommends you get an **unrestricted** licence by either:

- **Holding an approved accreditation** by completing and obtaining statements of attainment for all of the following units of competency through a registered training organisation (RTO):
  - RTC3704A or AHCCHM303A – prepare and apply chemicals
  - RTC3401A or AHCPMG301A – control weeds
  - RTC3705A or AHCCHM304A – transport, handle and store chemicals.

Biosecurity Queensland encourages licence applicants to undertake the approved accreditation with an RTO rather than sit the examination.

- **Passing the written licence examination** based on the following reference material:
  - Agricultural chemical users' manual, a Biosecurity Queensland publication
  - *Agricultural Chemicals Distribution Control Act 1966*
  - Agricultural Chemicals Distribution Control Regulation 1998 (the legislation).

There are three areas defined in the ACDC Act 1966. Refer to figure 4g.1 for general locations:

Unregulated (excluded) areas: these are mainly western and far northern regions. You **do not** need a license or permit for the ground distribution of herbicides in this area.

Regulated areas: you **will** need a licence if you use non hand-powered methods to distribute herbicides. If you use hand powered equipment to distribute herbicides you **do not** need a licence.

Regulated hazardous areas: if you are distributing any herbicide regardless of the type equipment being used within a hazardous area, then **you need a licence**. Regulated hazardous areas also have restricted or banned herbicides. If you are applying restricted herbicides in hazardous areas, **you may need a permit in addition to a licence**. You will require a permit in addition to a licence if you apply restricted herbicides using applications other than the following **authorised techniques** of:

- cut stump, basal bark and frill ringing, provided they occur more than 100m away from crops susceptible to the herbicide that are growing on neighbouring properties; and
- stem injection.

It is strongly recommended that you use an alternative herbicide that may be applied in a hazardous area without the need for a distribution permit. Contact the Organisational safety and wellbeing unit if you require a permit.

Hazardous area no. 1: the total area administered by the Moreton Bay Regional Council and the Sunshine Coast Regional Council. The restricted herbicides for hazardous area 1 are any herbicides containing:

- picloram;
- an ester formulation of 2,4-D; or
- an ester formulation of MCPA.

Hazardous area no. 2: broadly, this area consists of the Darling Downs and adjacent areas. The restricted herbicides for this area are any herbicides containing:

- an ester formulation of picloram; or
- any ester formulation of 2,4-D is totally banned from use in hazardous area no. 2.

Hazardous area no. 3: broadly, this area consists of a substantial area surrounding the town of Emerald. The restricted herbicides are any herbicides containing**:**

- an ester formulation of 2,4-D.

For precise details of your location to see if you fall within these hazardous areas or regulated areas, please access the interactive atlas.

Figure 4g.1 gives some guidance on whether you may need a license and/or a permit to apply herbicides in Queensland.

Do I need an ACDC herbicide licence to distribute (spray, spread or disperse) ANY herbicide, or any preparation containing herbicides, using ground equipment (any machine or apparatus other than an aircraft), at a DoE worksite?

Identify if you are located in a **regulated hazardous area**, a **regulated area** or an **unregulated (excluded area)** refer to the ACDC interactive atlas for your precise location.

I am in a **regulated hazardous area – check for restricted and banned herbicides**

You need an ACDC licence for ANY application of herbicide in the area whether applied by hand powered or motorised means.

- I am applying a **restricted** herbicide
  - I am using an **authorised technique** → You must have an **ACDC licence** but you do not need a distribution permit.
  - I am using an **unauthorised technique** → You must have an **ACDC licence and a distribution permit** to apply a restricted herbicide.
- I am applying a non-restricted herbicide → You must have an **ACDC licence** but do not need a distribution permit.

I am in a **regulated area**

You **need a licence** if you are applying herbicides using non-hand powered methods e.g. applying a herbicide using a tractor with a boom spray.

You do not need a licence if you are only applying herbicides using equipment that is:

- hand-powered
- equipment powered by compressed air or gas applied directly to the spray liquid for distribution without the use of air blast techniques
- hose proportioning devices.

I am in an **excluded (non regulated) area**

You **do not need** any licences or permits as application of herbicides presents minimal risk to adjacent properties in these regions

Once you have obtained your licence or licence and permit, you can apply your herbicide.

You can apply your herbicide now.

If you are a licensed operator, you are permitted to supervise (within sight and hearing at all times) an unlicensed operator/group of unlicensed operators to use ground equipment to carry out ground distribution.

You must keep records as required by the ACDC Act 1966.

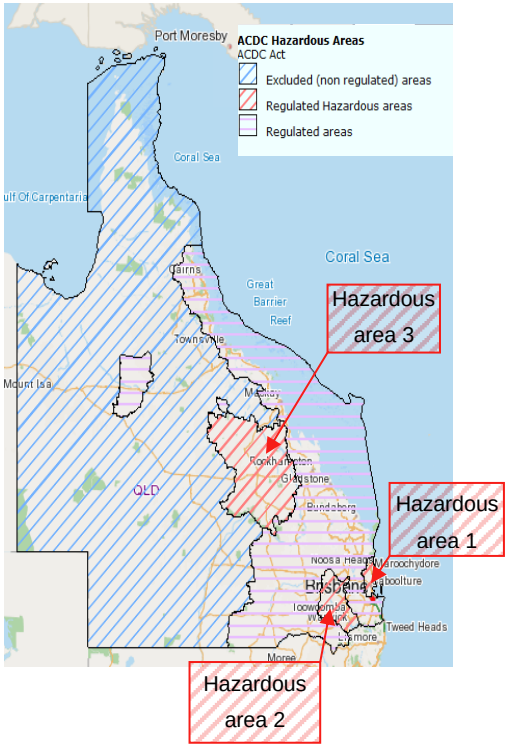


Figure 4g.1: Flowchart for determining if an ACDC licence and or permit is required. The map show general localities for areas regulated in Queensland for the ground distribution of herbicides. For precise details of your location to see if you fall within these regulated or hazardous areas, please access the interactive atlas

Chapter 5: chemical risk management

Chemical risk management

The purpose of this chapter is to assist departmental staff to adopt safe management practices for the management of chemicals in the workplace.

The users of chemicals need to ensure that a sound risk management process is in place to identify and manage the risks before using any chemical product.

- For **non-hazardous** chemicals this process can be achieved through regular planning and following the manufacturer's safe directions for use.
- For **hazardous** chemicals DoE requires that a chemical risk assessment is completed for all hazardous chemicals.

It is expected that employees who work with chemicals take a proactive role in the risk management process by:

- sourcing relevant information and provide accurate feedback e.g. use SDS, report incidences; and
- working together with others to assist with the risk management process.

Utilising the knowledge and experience of these staff helps to achieve a more accurate outcome. These staff know the most about their work and the hazards/risks inherent in the chemical work.

5.1 Types of risk assessments

The *WHS Regulation 2011* (s32-38 and 351) sets out the requirements for the management of risks related to using, handling and storing of hazardous chemicals at a workplace.

Whilst the legislation does not specifically require a risk assessment, to achieve the intent of the Regulation, it is a DoE requirement to complete a risk assessment process for all hazardous chemical tasks.

The chemical can be included in a generic risk assessment or as an individual risk assessment; types of assessments are described below.

The purpose of a risk assessment is to enable decisions to be made about appropriate control measures, training and student/worker health.

A summary of the risk assessment process is shown in a flowchart in Appendix 5a

A risk assessment template for managing non-curriculum hazardous chemicals in DoE workplaces can be found as an attachment to the department's Managing chemicals procedure.

This template sets the minimum requirement for the documentation of a chemical risk assessment as recommended in the Hazardous Chemical Code of Practice (2011). It is recognised that some schools or curriculum areas may adopt more detailed risk assessment proformas. Where an alternative risk assessment proforma is used, it must include all the elements of the template **as a minimum**. Users are to ensure that the risk assessment is appropriate to the task being undertaken.

5.1.1 ChemWATCH and risk assessments

If ChemWATCH Gold FFX Control Banding Risk Assessment (CoBRA) is used for chemical risk management, users must be aware that CoBRA assessments must meet DoE minimum requirements.

CoBRA risk assessment functionality represents a tool to *assist* with chemical risk management compliance. CoBRA offers a 'user-defined' risk control option which allows 'fit-for-purpose' assessments. Whilst the approach taken of incorporating control-banding is generally better suited to large organisations with standardised activities such as processing lab work or cleaning applications, it may assist with the simple activities in DoE workplaces which involve more common chemicals where hazards are well understood.

Control banding emphasises the controls needed to prevent hazardous substances from causing harm to people's health at work by focusing resources on exposure controls. A single engineering *control* or strategy

is matched with a single *band*, or range of exposures (e.g. 1-10 mgm^{-3}) for a particular class of chemicals (e.g. skin irritants or reproductive hazards).

Control banding is not without limitations. It still requires knowledge and experience to confirm that the control measures specified have been properly selected, installed, maintained and used. As such, users need to be aware that when using the CoBRA tool, they will **additionally** need to take into consideration:

- **Physical hazards** – control banding predominantly focuses on minimising chemical exposure on a **health** basis, rather than assessing physical hazards such as toxic gas release or ignition of vapours from processes. Such physical hazards still need to be considered as part of the risk management process. Always check section 16 of the product SDS to check if the manufacturer has included any supplementary information about the chemical you should consider.

  In addition, you should also review your workplace processes to ensure you have identified any remaining physical hazards that have not yet been considered and need to be controlled.

- **Site specific issues** – any risk assessment must address site-specific issues/environments that may not be covered by the software (e.g. activities involving special needs students, enclosed workshop areas, specialised storage, local building ventilation considerations).

- **Verification** – as with any risk control system, hazard controls identified in CoBRA need to be verified to ensure that they are implemented and maintained. Risk controls need to be monitored to ensure that any controls implemented are used and working as expected/designed and exposures are below the exposure standard described in the SDS (i.e. are the controls effective). Whether control banding or another process is used, risk controls should always be tested and reviewed (WHS Regulation 2011; S37 Maintenance and S38 Review).

When the points above are considered in conjunction with the use of CoBRA for chemical hazard management, the system can be viewed as supporting the requirements of the WHS Regulation with regard to risk assessment. The software also aids in record keeping and transparency in risk assessment decision-making. You may also consider linking existing documentation (e.g. standard operating procedures, emergency actions) with CoBRA functionality to maximise the effectiveness of your risk management processes.

5.1.2 Other types of risk assessments

Note: The Chemical hazards in the curriculum template is to be used for student based **curriculum** activities using chemicals.

The way in which an assessment is conducted depends on the circumstances of the workplace.

The risk assessment template caters for **non-curriculum** based activities in DoE workplaces and has the flexibility to allow the assessment of risk associated with using or undertaking:

a. **a single chemical,** which may be risk assessed on the potential hazards for the purpose of purchasing it, storing it or using it (e.g. using inorganic lead, mercury or chromate which must be risk assessed for health monitoring purposes; preparing dilutions from stock acid; determining storage risks for flammable liquids);

b. **a specific work process involving a chemical or group of chemicals,** which may be assessed to determine how a person using a chemical during a specific work process may be exposed or placed at risk (e.g. using corrosive or flammable products during a cleaning process);

c. **a workplace or work area,** which may be assessed for risk to identify the hazards associated with undertaking a chemical operation in the workplace and how a person using a chemical in the workplace may be exposed to chemical hazards;

   An example of this type of assessment may consist of the collection of information and hazard identification of the workplace using a checklist. The assessment should be based on information on chemical labels and Safety Data Sheet (SDS), for example, precautionary phrases on labels could be used to get an idea of how a person using a chemical may be exposed. In some cases, considerably more detail will be required, particularly where:

   - a significant risk to health is suspected (e.g. inhalation of fumes in a manual arts spray finishing room);

- there is uncertainty about the degree of risk (e.g. chemical instability, insufficient information about the chemical; uncontrolled reactions); or
- there are complex chemical processes and/or exposures involved (e.g. use of a chemical that requires health monitoring, decontamination of plant and equipment – a science prep room, an agricultural studies spray operation); and

d. a generic assessment where the same work tasks are undertaken across similar workplaces or work areas (e.g. storage of DG6 substances in a designated storage cabinet; routine application of a horticultural chemical as part of crop production; storage of compatible chemicals in a storage area in a primary school science store). If the same chemical or process is used over a number of workplaces, the generic risk assessment may be used over all of these workplaces. When conducting a generic assessment, you should consider that the workplace, tasks and chemicals being assessed are identical in characteristics, properties, potential hazards and risks. When a generic assessment is undertaken it is to be checked for validity at each individual workplace. Staff at alternate workplaces can make modifications to suit their individual circumstances.

5.2 Process for conducting a risk assessment for the use of chemicals

While appendix 5a provides a flow chart summary of the detailed steps in the risk assessment process as listed below

Step 1 – decide who will do the risk assessment

The staff who conduct the assessment (assessor/s) should have sufficient knowledge and skills to evaluate the health risks to workers arising from the use of hazardous chemicals in the context it is being used. Both the assessor and the staff using the chemicals should be able to:

- interpret the information on a safety data sheet (SDS) and labels;
- observe the conditions of work and foresee potential problems;
- communicate effectively;
- draw all the information together to form valid conclusions about exposures and risks; and
- report the findings accurately to all parties concerned.

A risk assessment can be undertaken at any time however this may not be an effective safety management practice or a good use of time and resources. Risk assessments can be initiated when:

- there is something new about the task e.g.:
  - when a job or experiment is first performed, or a new chemical is used; or
  - as part of developing and designing a new curriculum or course material.
- new or relevant information regarding the product or health and safety becomes available (e.g.):
  - a new or modified SDS, a new policy or procedure; or
  - when there has been an incident or injury to a person.

Step 2 – divide the work into units for assessment

To make the risk assessment easier, you can identify any jobs, tasks or processes for the activity. This is particularly useful for generic risk assessments that need to consider a wide range of hazards across a large location/work area. Investigating the workspace and looking at operating procedures should help with this. Dividing a small workplace in this way may not be necessary when only a few chemicals and persons are involved.

Step 3 – identify chemicals used in the work

When identifying a hazardous chemical used or intended to be used, it is important to recognise that it could exist in various states or forms – solid, liquid, gas, vapour, dust, mist or fume. Chemicals used in the workplace can be identified by:

- referring to labels, stock lists, manifests, inventories and registers;
- checking all locations where chemicals are used or stored; and

- considering all chemicals that are used in, or that arise from, ancillary work such as maintenance and repair, cleaning, research or testing.

Step 4 – determine if the chemicals are hazardous

Use SDS and chemical container labels for information on whether each chemical is a hazardous substance or dangerous good. Section 2 of a GHS format SDS identifies the hazardous nature of the chemical. If there are no hazards identified in this section, then the chemical is not classed as hazardous. **If you are unsure if the chemical is a hazardous chemical contact the supplier.**

By their very nature, some chemicals can pose significant risks to the health and safety of those exposed to them. The level of risk is determined by:

- the intrinsic 'hazard' of chemical substances (what the chemical could do, rather than what it does if you use it properly); and
- the 'quantitative exposure' to humans or organisms in the environment (broadly, the risk of exposure is determined by the amount of exposure and the duration of exposure).

Note that diluted solutions will present a reduced level of risk and in some cases they may no longer be considered to be hazardous chemicals. Refer to the SDS for hazardous cut offs. Separate assessments may be required for preparation of working solutions and the use of these solutions.

Step 5 – obtain information about hazardous chemicals

Collect information (e.g. from container labels and SDS) about the chemicals, routes of exposure, recommended control measures and other action to prevent or minimise risks. Databases such as ChemWATCH may assist with the collection of information.

Where the nature of the hazard is very serious, or chemical processes are complex, it may be necessary to obtain more detailed information from other sources, for example, from the manufacturer or supplier of the chemical, a specialist (industry or tertiary sector) or an organisation that can provide reliable information (e.g. Work Health and Safety Queensland).

Step 6 – inspect workplace and evaluate worker exposure

Information should be sought to answer the following questions when inspecting and evaluating worker exposure during work processes involving hazardous chemicals.

Step 6(a) – is the hazardous *chemical* released or emitted into the work area? *Look for evidence that workers are being directly exposed to uncontrolled hazardous chemicals during a work process or are showing symptoms of exposure. Consider:*

- evidence of contamination, that is dust or fumes visible in the air or on surfaces, substance visible on a person's skin or clothing, odour, visible leaks, spills or residues;
- handling substances, for example, powders not in containers;
- chemical splashes; and
- worker's experience or symptoms of exposure.

If the hazardous chemical is not released or emitted into the work area, go on to Step 7.

Step 6(b) – are workers exposed to the hazardous chemical through inhalation, ingestion, skin or eye contact or accidental injection? It is important to identify the types of exposure which might affect workers. People may be exposed by:

- working directly with the hazardous chemical;
- working near or passing through areas in which the hazardous chemical is stored or being used; or
- cleaning or maintenance work in areas where a hazardous chemical might be present.

Step 6(c) – how long are workers and others exposed to hazardous chemicals? *It is important to identify the amount of a hazardous chemical workers are exposed to and the length of time over which exposure occurs. Ask:*

- does exposure occur intermittently or continuously?
- does exposure occur frequently?
- what are the different routes of exposure?
- how many workers and other people (members of the public) are exposed?

Health monitoring is rarely required in DoE settings. Appropriate knowledge, skills and experience in the techniques and procedures is required if undertaken (refer also to appendix 2a).

Step 6(d) – what control measures are used or proposed? Are the existing control measures effective, properly used and maintained? All existing control measures must be identified and consideration given to any proposed control measures to minimise or eliminate the exposure of a worker to a hazardous chemical. Consider:

- are any engineering controls in place, such as isolation or enclosure of processes?
- are general ventilation and local exhaust systems effective and adequately maintained?
- are workers trained in the proper use and maintenance of control measures?
- do work practices ensure safe handling?
- are appropriate personal protective clothing and equipment used and maintained in a clean and effective condition?
- are facilities for changing, washing and eating meals in good condition? Good personal hygiene practices can substantially reduce a worker's exposure to a hazardous chemical.
- are good housekeeping practices in place?
- are all hazardous chemicals stored correctly?
- is disposal of waste appropriate?
- are appropriate emergency procedures and equipment in place (e.g. eye wash facilities, safety shower)?

Step 6(e) – are there any risks associated with the storage and handling of the hazardous chemical? These types of risks often relates to spillage and fire. Under these circumstances, workers might be exposed briefly but at high concentrations to the substance or by-products of the product as a result of spillage or fire.

Step 7 – evaluate the risk and determine conclusions about the risk

The information from the previous steps will provide the necessary information to establish:

- the nature and severity of the hazard for each hazardous chemical;
- the degree of exposure of persons in the workplace; and
- whether existing control measures adequately control exposure.

It is now possible to make a conclusion about the acceptability of risks of using a hazardous chemical. Consultation should take place to decide if the risk is significant. Based on the definitions of the Hazardous Chemicals Code of Practice used in the DoE risk assessment, risk significance is related to the conclusion reached in the risk assessment:

Conclusion 1: risks are not significant	✓ **proceed**
Conclusion 2: risks are significant but effectively controlled	✓ **proceed**
Conclusion 3: risks are significant and not adequately controlled	✗ **do not proceed**
Conclusion 4: uncertain about risks	✗ **do not proceed**

In DoE workplaces, activities involving chemicals may only be undertaken at the risk conclusion 1 or risk conclusion 2 levels. Once risks are classified as not effectively controlled (conclusion 3) or there is not sufficient certainty about the risks associated with an activity (conclusion 4 activities), the level of exposure to a chemical cannot be determined with confidence and the activity becomes unsafe. Thus, **conclusion 3 risk classifications must be revised to reduce the risks, as risks are not effectively controlled.**

Conclusion 4 activities are not to proceed because there is insufficient information available to make a valid risk conclusion. Additional information must be obtained to establish the risks. Further advice about determining risk conclusions can be found in the Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013.

Step 8 – implement control measures to address actions required from risk management

Document the control measures identified in the SDS and the previous steps. If assessment shows there is a risk to health, further actions should be taken to implement appropriate control measures, provide training, and establish emergency procedures and first aid. In some circumstances two or more control measures may be required to reduce exposure to a level as low as is reasonably practicable. The preferred order in which control measures should be implemented is:

1. elimination;
2. substitution;
3. isolation; and
4. engineering controls.

If the risk still remains, the following can be adopted:

5. administrative controls; and
6. personal protective equipment (PPE).

The objective of identifying a control measure or combination of control measures is that it will eliminate or minimise exposure to keep workers safe. Control measures are discussed further in Appendix 5a.

Step 9 – record the assessment

The risk assessment template can be used to record the assessment. Before workers can undertake the task or work with the chemical assessed, the risk assessment is to be approved by the relevant supervisor or manager.

Step 10 – review the control measures

All measures for the control of exposure should be thoroughly examined and tested at regular intervals to ensure effective performance. Controls should be reviewed immediately if work related ill health is reported. Routine maintenance including preventive service procedures should be established specifying:

- which control measures require servicing;
- the servicing needed and who is responsible for servicing;
- the frequency of servicing;
- how any defects will be corrected;
- performance testing and evaluation; and
- record of servicing.

Templates to assist with routine maintenance and servicing can be found here.

Risk assessment resources:

- Managing risks with chemicals in Department of Education (DoE) Workplaces Procedure
- Chemical risk assessment template (non-curriculum activities)
- Chemical Hazards in the Curriculum template for student based **curriculum** activities

Appendix 5a – the chemical risk assessment process

The purpose of a chemical risk assessment is to identify any potential hazards and to assess the risks associated with those hazards in terms of their potential to do harm. This process allows appropriate control measures to be developed to reduce the risk to the lowest practicable level.

All the factors in a risk assessment are interconnected (figure 5.1). For the purposes of performing an assessment, the person(s) undertaking the assessment should consider the factors in isolation and then consider their combined effect. The factors are:

- the risk associated with the hazard (for example, chemicals are inhaled, get on skin or in eyes);
- the probability that an event or an exposure will occur;
- the length of time of exposure a person has to the hazard (ranging from occasional to continuous contact with the hazard); and
- the possible consequences that may result, for example, irreversible eye damage, causing liver disease, and burns.

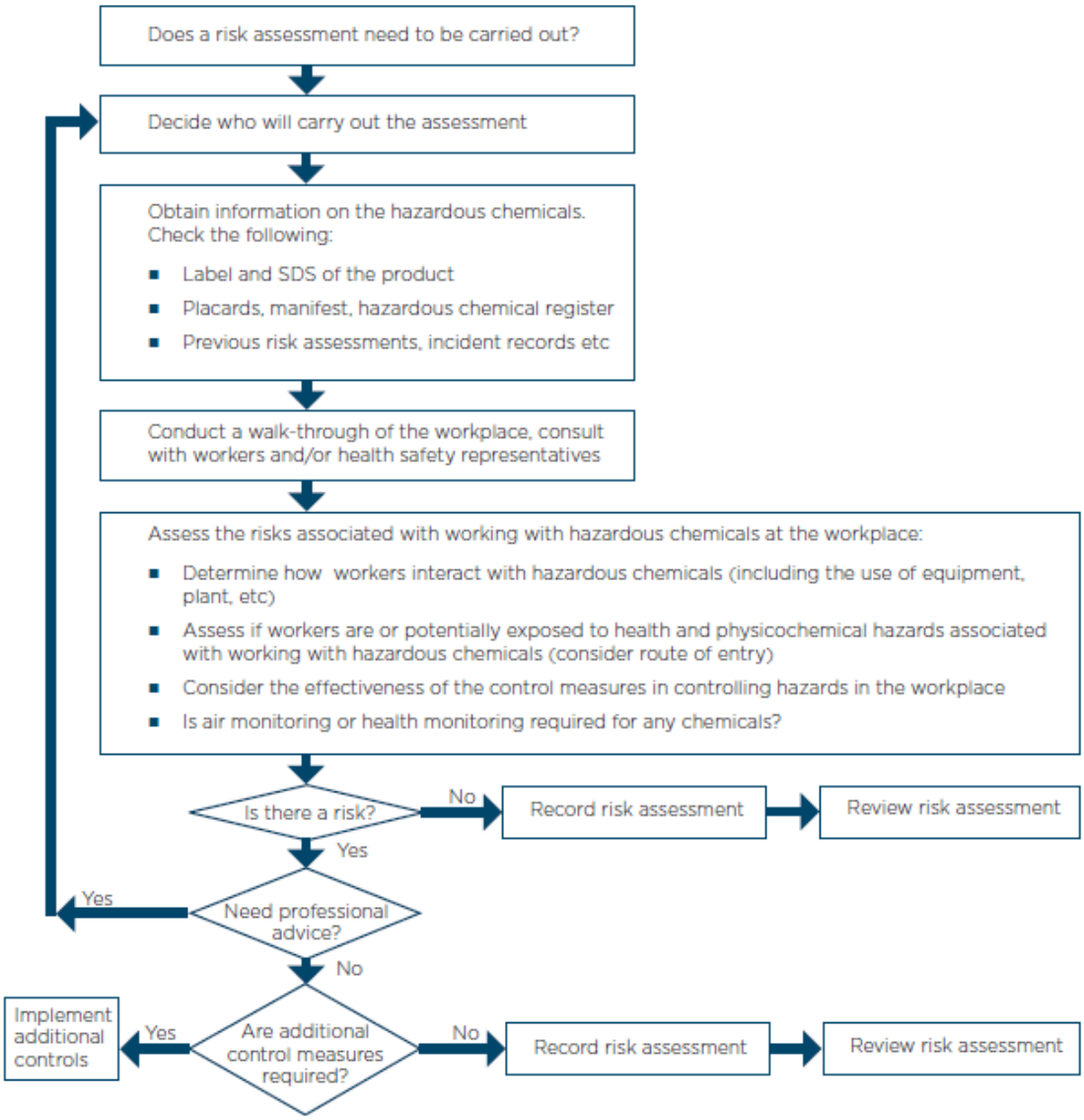


Figure 5.1: An overview of the process for the assessment of health risks arising from the use of hazardous chemicals in the workplace. Source: Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013.

A comprehensive and user friendly guide to the management of risk associated with hazardous chemicals is described in the Managing Risks of Hazardous Chemicals in the Workplace Code of Practice 2013.

The hierarchy of control

The application of the hierarchy of control measures involves firstly assessing whether a hazardous chemical can be eliminated. Where this is not practicable, substitution should be considered. If this is not practicable, consideration should be given to each of the other control measures in turn, with the objective of identifying a control measure or combination of control measures that will eliminate or minimise exposure.

Elimination: where a work activity involves the use of a hazardous chemical that is not essential to the work activity the hazardous chemical should be eliminated. Examples include:

- using a physical process rather than a chemical process to clean an object, e.g. use of ultra-sound;
- using clips, clamps or bolts instead of adhesive; and
- purchasing supplies of a material in a ready cut and sized form rather than use a dust-producing cutting process in the workplace.

Substitution: where the use of hazardous chemicals cannot be avoided it may be possible to use a substitute chemical that is less hazardous, the same substance in a less hazardous form or the same substance in a less hazardous process. Examples include:

- using a hazardous chemical in paste or pellet form rather than a dusty powder; and
- brush application of paint rather than aerosol application.

Isolation: another approach is the separation of the process from people by distance or the isolation of the process by use of barriers to prevent exposure. For example, not running internal combustion engines in enclosed or partially enclosed spaces like sheds, rooms or loading docks will minimise carbon monoxide exposure.

Engineering controls: A range of engineering measures may be used to remove or reduce exposure to a chemical (e.g. the use of plant or processes which minimise the generation of a hazardous chemical, suppress or contain a hazardous chemical or limit the area of contamination in the event of spills or leaks. Types of engineering controls include:

- enclosure or partial enclosure e.g. enclosed reaction vessels;
- local exhaust ventilation e.g. local extraction systems attached to grinding machines; and
- automation of processes e.g. the automation of the removal of objects from degreasing baths.

Administrative controls: reduced exposure of individual workers to hazardous chemicals can be achieved by work practices which require people to work in safer ways and are intended to limit the extent of exposure. Examples include:

- excluding non-essential persons from a work area;
- prohibiting eating, drinking and smoking in contaminated areas;
- prohibiting the use of compressed air for cleaning purposes;
- vacuuming dust from areas where cutting processes take place;
- providing first aid, safety shower and eye wash facilities, evacuation and emergency procedures; and
- instructions and training

Stringent work procedure should be enforced for people working alone, making provision for back-up in case of emergency. Similarly procedures for work outside of normal work hours must take account of the potential for a lack of necessary support services.

Personal protective equipment (PPE): the use PPE should not be regarded as an alternative to engineering or other options for controlling exposure, but utilised to supplement other controls especially where it is difficult to ensure protection with the other measures. Situations where the use of suitable personal protective equipment may be necessary include:

- where it is not technically feasible to achieve adequate control by other means. In these cases, exposure should be reduced as far as practicable by other measures and then, in addition, suitable PPE should be used to secure adequate control;
- where PPE is necessary to safeguard health until such time as adequate control is achieved by other means, for example, where urgent action is required because of plant failure;

- during routine maintenance operations where the infrequency and small number of people involved may make other control measures not practicable; and
- where SDS and labels indicate the need for PPE.

The ongoing costs (e.g. training and maintenance and/or replacement) and operator considerations (e.g. correct fit and medical factors) associated with PPE should be given significant consideration before determining it as the preferred control option. To ensure PPE is effective as a control it should be:

- selected for the contaminant, task and the operator in accordance with appropriate standards for the equipment;
- readily available and replaced as required;
- clean, functional and appropriately maintained;
- checked before use; and
- correctly used when required

Following the selection of appropriate PPE as a control measure, training should be provided to ensure it is properly used. It is helpful to use a PPE register to manage PPE.

Chapter 6: disposal

Disposal

All chemical users have a responsibility to dispose of unwanted or unused chemicals in a safe manner that does not adversely affect other people or the environment. Chemical waste includes solvents, acids, alkalis, metals, precipitates, toxic materials, paints, oils, pesticides, herbicides, contaminated glassware and consumables, containers and chemicals that are no longer required or have deteriorated with age.

> ⚠ Supervisors/managers are responsible for minimising the generation of hazardous chemical waste by establishing local procedures based on a risk management approach that is consistent with these guidelines. They should ensure that staff and students **follow the established procedures**.

Good management practices will assist to reduce risks around disposal.

- Investigate ways to eliminate or substitute a chemical for a safer one to reduce disposal risk and costs by:
  - controlling pests, weed or insect problems by alternative non chemical methods;
  - purchasing chemicals in reusable, returnable containers or try to obtain recyclable containers;
  - coordinating with other DoE workplaces to minimise the amount purchased; and
  - substitute nonhazardous, biodegradable chemicals for hazardous chemicals. Use of these chemicals will reduce the volume of hazardous waste generated.
- Be prepared to deal with leaks and spills by stocking and maintaining spill control kits, using secondary containment (i.e. trays) and training staff in emergency responses.
- Record waste disposal volumes so you can assess your waste generation and disposal with the aim of improving your operations and minimising the amount of chemicals used.
- Where practical, segregate compatible chemicals to improve the potential for reuse or recycling. This may also reduce disposal costs as ‘mixed waste’ often incurs greater costs.
- Train personnel in chemical safety, including proper handling techniques to prevent or minimise spillage, contamination and wastage, correct disposal techniques and pollution prevention.
- If you regularly generate wastes that can be treated, include waste treatment in your procedures.

When using chemicals a few simple considerations may avoid creating waste:

- Do not buy more than you need.
- Do not mix more than you need for immediate use.
- Take care to avoid spillage during mixing, handling and storage.

Prior to disposing of chemical waste, chemical users **are to:**

- always follow any information about the disposal of a particular chemical including appropriate protective equipment;
- ensure all waste is labelled – see Chapter 4.6. Include the name of the chemical, total quantity and concentration, appropriate risk and safety phrases and relevant dangerous goods information for the transport of waste;
- segregate incompatible chemical wastes as far as possible to reduce the risk of a dangerous reaction;
- segregate radioactive, biological and hazardous chemicals;
- ask for advice from suppliers or local authorities when needed;
- comply with local authorities requirements for the disposal of chemicals;
- dispose of waste as soon as practicable; and
- store and handle the waste as you would the chemical (i.e. using SDS requirements).

Chemical users **are NOT to**:

- eat, drink or smoke during disposal work;
- mix chemicals together before disposal;
- allow waste to discharge into drains or watercourses or to contaminate groundwater;
- re-use containers or convert into containers for food or water or accumulate used containers; or
- use food or drink containers to store or dispose of chemicals.

6.1 Surplus chemicals

When disposing of surplus chemicals, the options in order of preference are:

- Return unopened containers to the supplier, manufacturer or chemical recycling company.
- Offer the surplus chemical to another departmental workplace that needs it for an approved purpose.
- Arrange for collection by an approved waste disposal contractor.
- In the meantime, all chemicals should be labelled and stored in a secure and safe place.

6.2 Disposal of chemical waste

Chemicals may be disposed of in a number of ways:

- Through recycling and reclamation.
- Through the sewerage system.
- Separation of nonhazardous waste from hazardous waste to reduce volumes generated.
- In-house treatment (e.g. neutralisation, deactivation, precipitation, ion-exchange).
- In landfill.
- Collected by a licensed chemical waste contractor for disposal.

Chemical disposal methods for the more common substances used in DoE workplaces can be found in appendix 6a.

Small amounts of a wide range of chemical residues produced in laboratory operations may be safely disposed of to the **sewerage system**. However, there are many chemicals for which this is **not appropriate**

To ensure the chemical waste meets the local authority Trade waste policy guidelines and is acceptable for disposal to sewer, waste:

- must be soluble in water – water-immiscible organic liquids such as petroleum hydrocarbons and chlorinated compounds cannot be washed to waste;
- must not be a solid or viscous substance in a quantity, or of a size, that can obstruct, or interfere with the operation of the sewerage facility (e.g. ash, sand, tar, oil and grease);
- containing environmentally persistent chemicals such as heavy metals and various organic compounds cannot be disposed to sewer (e.g. lead, mercury, nickel, organophosphates);
- containing pesticides, herbicides, or fungicides cannot be disposed to sewer;
- must not be toxic or hazardous to aquatic, marine and terrestrial life and environments;
- composed of flammable liquids (miscible short chain alcohol solutions only) must be diluted to ensure there is no accumulation of alcohols in the under sink traps that has the potential to create a fire hazard;
- composed of concentrated solutions of acids and alkali cannot be disposed to sewer;
- composed of weak acid and alkali solutions need to be neutralised to between pH6.5 and pH8.5 prior to sewer disposal;
- compounds which produce toxic vapours, such as cyanide, ammonia, formaldehyde and glutaraldehyde must not be disposed of down the sink (EPA Regulation 2009 Schedule 9);
- composed of unknown or unlabelled chemicals or large quantities of chemicals by the sewer; and
- composed of viable biological material (e.g. live algae, bacteria, enzymes).

While disposing a chemical to sewer, flush with sufficient water to ensure no trace of chemical remains (e.g. 20 x volume of water). Further information relating to Trade Waste can be found here or on your local city council website.

For chemicals which are to be disposed of via **landfill or collection:**

- waste is to be sealed in its original container or an appropriate and compatible container; and
- the container should be clearly labelled with the original label if in good condition or a replacement label attached if required.

Local authorities or landfill operators will be able to advise if chemicals are accepted at their landfills or waste transfer stations, or will need to be collected by a licensed chemical waste contractor. Unknown/unlabelled

chemicals and large volumes of unwanted chemicals will usually need to be collected by a licensed waste contractor for appropriate disposal.

The process for disposing of chemicals through a **licensed waste contractor** and a list of some of the licensed waste contractors that are able to service all of Queensland is shown in Appendix 6b.

Current information and advice on the disposal of veterinary products, pesticides and herbicides can be found on the AgStewardship webpage.

6.3 Disposal of empty containers

- All empty containers must be rinsed thoroughly to remove any traces of the chemical. If manually rinsed, the containers must be triple rinsed.
- Empty herbicide drums must be rinsed and disposed of, or recycled in the manner noted on the label. Effluent from this process should be treated as hazardous and handled accordingly.
- The chemical label must be removed or defaced so that the chemical name cannot be identified.
- Store rinsed containers securely and remove lids or bungs to prevent reuse.
- Containers should be returned to the supplier when they are marked returnable, or the label specifies return to point of sale.
- If not returned to supplier, render the container unusable to ensure that it cannot be used for any purposes.
- Do not burn empty containers.

6.4 Disposal of other items – oil drums, gas cylinders, batteries, consumables, flares

Like other chemicals, these items are to be disposed of in a responsible manner.

- Oil drums and gas cylinders are not be reused for any other purpose.
    - Contact the original supplier or local landfill operator to determine the best method of disposal.
    - Used oil is a recyclable resource and there may be local agencies or companies that can assist with recycling strategies.
    - Empty gas cylinders should be segregated from full gas cylinders and returned to the supplier.
- Nickel cadmium (NiCad) batteries contain cadmium, which is potentially carcinogenic.
    - NiCad batteries should not be placed in general waste bins, several battery suppliers offer recycling/disposal options – refer to Appendix 6b and local recycling companies (e.g. battery suppliers).
- Some consumables include certain chemicals that require appropriate disposal.
    - For example, some data projector and microscope light bulbs contain mercury (see Disposal of energy efficient lighting tubes and bulbs fact sheet.)
- A range of companies provide recycling/disposal options – refer to Appendix 6b and local recycling companies.
- Disposal of marine flares can be arranged by accessing Maritime Safety Queensland's website and contacted the closest location that is able to accept the flares.

Appendix 6a – waste disposal methods for substances common in DoE workplaces

These methods use chemical in-house processes of precipitation, solvent extraction or ion exchange to treat chemicals to reduce hazardous waste to more manageable waste volumes, or access external disposal contractors. Note that precipitates (ppt) formed through treatment are disposed of separately to their filtrates.

Source: Modified and adapted from Flinn Scientific: https://www.flinnsci.com/api/library/Download/6c645f886f734bcab65e385a3e704fa3. See source for disposal procedures.

Disposal Method	Compound	Treatment (add)	Forms (ppt)	Disposal (solid)	Forms (filtrate)	Disposal (liquid)
1	Solid inert waste	Dispose of in rubbish bin. Large amounts of waste should be placed in industrial bin. Do not leave for cleaners.				
2	Drain (sewer) disposal (non-toxic, water soluble liquids usually <20% concentration)	Dilute with a large (>20 X) volume of water. Dispose down drain connected to sewer. (Never down storm drains. Refer to Environmental Protection Regulation 2008, Schedule 9 for what cannot go down drains).				
3	Neutralisation	Adjust to pH range 6.5 - 8.5. (pH range is set by EPA Regulations 2004).				2
4	Hydrocarbons (non-halogenated) volatile	Pour a thin layer into a metal pan and evaporate in a fume hood (e.g. methylated spirits, paint thinners, hexane, ethanol). Do not leave unattended. Avoid ignition sources.				
	Hydrocarbons (non-halogenated) NON-volatile	Place into labelled containers and take to hydrocarbon recycling (motor and vegetable oils, grease and fat waste). Contact your local council or check the council's website for information about your nearest used oil recycling facility.				
5	Barium salts	Treatment option 1: Dilute sulfuric acid	Barium sulfate	9	Acid	3
		Treatment option 2: Excess sodium sulfate	Barium sulfate	9	Alkali	3
6	Very strong oxidisers eg sodium/ potassium chromate/ dichromate, chlorates, bromine, iodine	(Part 1) Excess sodium thiosulfate. Adjust pH to 2-3 [3M] sulfuric acid. Stand for 1 hour.	temperature rise (if no temperature rise add more sulfuric acid)			Continue (part 2)
		(Part 2) Excess sodium carbonate. Stir (approx. 1 hr).	Chromium(III) carbonate	9	carbonate ions	Test for chromium by adding a 1 mL sodium carbonate. If no ppt forms then use 2.
7	Lead compounds	Excess sodium sulfide. Stir (approx. 1 hr) adjust to pH 7 [3M] Sodium hydroxide	Lead(II) sulfide	9	Sulphide ions	10
8	Silver (except nitrate)	Acidify dilute nitric acid/excess sodium chloride	Silver chloride	9	liquid	2
9	Precipitated compounds	Separate filtrate by decantation for heavy sludge or by filtration. Dry compound and filter paper. Avoid inhalation or generation of dust. Label bag for disposal.		Dispose of in suitable landfill (review local council trade waste requirements). If not approved for landfill arrange collection by disposal company (e.g. chromium, copper, lead, nickel, silver, zinc compounds)		
10	Sulfide ions	Excess Iron(III) chloride	Iron sulfide	9	liquid	2
11	Recycle/reuse/reclaim (e.g. metals)	Return chemical to be recycled/reused/reclaimed in labelled container				
12	Bio/clinical waste	Return to designated area in sealed, labelled biological waste bag for disposal according to local sterilisation arrangements.				
13	Potassium permanganate	Excess Sodium bisulphite	Manganese ions	9	liquid	2
14	Silver nitrate	Add solid Copper (metal) to the nitrate solution. Allow to stand 24hrs undisturbed. Filter, repeat if necessary.	Silver (solid), unreacted copper	11	copper nitrate	17

15	Calcium, sodium, potassium metal	Add very small amounts at a time very carefully to water in a trough and leave until completely reacted.			alkali	3
16	Oxalates, oxalic acid	Dissolve in water. Add excess calcium chloride	Calcium oxalate	9	liquid	2
17	Inorganic metal salts e.g. aluminium, copper, zinc, nickel, cobalt excluding 6, 7, and 8.	Excess sodium carbonate. Caution if excess heat is generated (e.g. aluminium chloride) – use ice bath.	Metal carbonate	9	liquid	Test for metal by adding a 1 mL sodium carbonate. If no ppt forms then use 2
18	Paints, Wood stains, Varnishes.	Remove lid. Allow to harden in a well-ventilated area. Replace lid and use 1.				
19	Fibreglass, epoxy adhesives, 2-part bog/filler compounds, cement.	React with catalyst. Allow to harden in well-ventilated area then use 1.				
20	Formaldehyde , Mercury, Phosphorus, and Cyanide/Cyanate compounds.	Licenced disposal company.				
21	Herbicides, fungicides, pesticides, veterinary products	Refer to SDS in first instance. Contact local ChemClear, ChemCollect or drumMuster program for disposal assistance. https://www.agstewardshipaustralia.org.au/				
22	Radioactive substances	Contact Queensland Health Unit for assistance. Email: Radiation_Health@health.qld.gov.au See http://www.health.qld.gov.au/radiationhealth/documents/app-dispose.pdf				
23	Scheduled waste	Requires special technologies and facilities at a licensed treatment facility. Includes polychlorinated biphenyls, hexachlorobenzene, and organochlorine pesticides. Contact waste disposal company.				

Appendix 6b – licensed chemical waste disposal contractors

Process for disposing of chemicals using a licensed chemical waste contractor

Step 1 – organise the chemicals for disposal

The chemical must be sealed in its original container or an appropriately labelled container that is suitable for storing the waste. The chemicals are to be labelled, handled and stored as any other hazardous chemical e.g. they must be stored compatibly with one another.

Step 2 – create a manifest (list) of the chemicals for disposal

The manifest includes the:

1. Waste generator details: workplace name, address, contact name and number.
2. Transporter details: name, address, contact name and number.
3. Date and time of transport.
4. Name of each chemical (proper shipping name – see section 1 of SDS.
5. Size (volume) of the actual container.
6. Type of container (e.g. glass, plastic, metal), actual volume of chemical in each of the containers.
7. Number (quantity) of containers UN number, dangerous goods class and sub risk, if applicable, packaging group (see section 14 of SDS).
8. Any other comments (e.g. container sealed; container broken/damaged/leaking).

Example chemical waste disposal manifest

Waste generator information: **Workplace name/address/site contact details:** Example State High School, 1 Smith Rd, Smithton. Sarah Smith Ph. 555 55 555.						
Waste transporter details: **Name/address/site contact details:** ChemTranZ, 1 Chemical Street, Potassiumvale. R.E. Action Ph.: 55555511						
Date and time of transport: 2nd August 2018						
Proper shipping name (from section 1 SDS)	**Size of actual container**	**Type of container** (e.g. Glass; Plastic; Metal)	**Actual chemical volume (gm; mL; L; kg)**	**Number of containers**	**UN number, dangerous goods class and sub risk** – obtain from label or SDS	**Comments -** container sealed; broken or leaking
Environmentally hazardous substance, Solid, N.O.S.(contains nickel(II) sulfate)	0.5 kg	Glass	250 grams	2	UN3077 DG Class 9 PG III	OK. Label intact.
Methanol	2 L	Plastic	1 L	1	UN1230 DG Class 3 sub risk (6.1) PG II	container ½ full and missing cap to seal on container
Formaldehyde solution with not less than 25% formaldehyde	2 L	Plastic	1.5 L	5	UN2209 DG Class 8 PGIII	One container leaking

Phosphorus, white under water	1L	Glass	60g Phosphorus; 500 mL water	1	UN1381 DG Class 4.2 sub risk (6.1) PG I	OK. Label intact.

Step 3 – obtain a quote from a licensed chemical waste contractor

Send the manifest of chemicals for disposal to a licensed waste contractor to obtain a quote. A disposal manifest template is provided in Appendix 6c.

Step 4 – finalise collection details with licensed chemical waste contractor

The principal/manager of the workplace is responsible for approval of the quote and costs associated with disposal. Once approval is obtained the workplace arranges collection and disposal of the chemicals with the licensed waste contractor.

Licensed chemical waste contractors

Below is a list and contact details for some of the licensed chemical waste contractors that are able to service all departmental workplaces throughout Queensland. However, this list is not exhaustive and does not mean that the listed contractors should be preferred over any other waste contractors.

Battery disposal

Some waste management companies run state or nationwide programs that recycle all types of batteries (except motor vehicle batteries). Battery World recycles a range of batteries as do Cleanaway and suez. Access online to locate your nearest recycling location.

Chemical waste disposal

AceWaste – www.acewaste.com.au
491 Gooderham Road Willawong QLD 4110
PO Box 400 Acacia Ridge QLD 4110
Ph: 07 3372 6666
Fax: 07 3372 3777

BCD Technologies –
http://www.plascon.com.au/bcd-technologies-pty-ltd.html
8-12 Krypton St Narangba QLD 4504
PO Box 119 Narangba QLD 4504
Ph: 07 3203 3400
Fax: 07 3203 3366

Geocycle - www.cemaust.com.au
12 Station Ave Darra QLD 4076
Ph: 07 3375 0478
Fax: 07 3335 3227

Cleanaway – www.cleanaway.com.au
26-32 Potassium Street Narangba QLD 4504
Ph: 07 32935555
Fax: 07 3204 1582

ToxFree – www.toxfree.com.au
160 Musgrave Rd Coopers Plains QLD 4108
PO Box 837 Archerfield BC QLD 4108
Ph: 07 3277 2474
Fax: 07 3277 2382

Suez
www.suez.com.au
51A Buchanan Road, Lower Nudgee QLD 4014
Ph: 1313 35

Veolia Environmental Services -
www.veolia.com.au
166 Boundary Rd Rocklea, QLD 4106
Ph: 07 3275 0125
Fax: 07 3275 0101

Appendix 6c – chemical waste disposal manifest

Waste generator information: **Workplace name/address/site contact details:**
Waste transporter details. **Name/address/site contact details:**
Date and time of transport:

Proper shipping name	Size of actual container	Type of container (e.g. Glass; Plastic; Metal)	Actual chemical volume (gm; mL; L; kg)	Number of containers	UN number, dangerous goods class and sub risk	Comments – container sealed; broken or leaking

Keep this record for five years.

Chapter 7: emergency planning

Emergencies

A leak, spill or uncontrolled release of a chemical may still occur even with appropriate control measures in place. The *WHS Regulation 2011*, section 43 requires that an effective emergency plan for the workplace must be prepared.

The purpose of the emergency plan is to minimise the effects of any dangerous occurrence or near miss at a workplace. This includes any incidents resulting from the handling of chemicals. To be effective, workers need to be appropriately trained, and any procedures tested.

Workers should be consulted and ideally directly involved in the development of emergency plans and procedures. This will assist to identify how issues may occur, e.g. release of a chemical, and any preventive actions that can be taken.

Emergency plans should be readily available in hard copy form at all times. The emergency plan should be easily accessible by all workers and should be discussed with emergency service organisations when it is updated or reviewed. The emergency plan is to be reviewed every five years or when there are changes at the workplace that affect the plan (e.g. larger quantities of chemicals).

⚠ Refer to the departmental Emergency Management and Response Plan for further information on completing an emergency management plan. You can address **chemical emergency planning for your worksite** within this document.

The specific issues relating to hazardous chemicals that should be addressed in the emergency management plan include the following:

- Technical information such as chemical and physical characteristics and dangers of every hazardous chemical (e.g. keep a copy of the hazardous chemical register in the administration office or near the fireboard). Review and update the chemical register regularly.
- Assessment of storage sites and handling areas and the potential impacts of a spill. Where appropriate install suitable handling equipment to minimise the likelihood of spillage and/or bunding to contain spills.
- The types of risks taken into account (e.g. fire, accidental release, poisoning, environmental contamination, toxic fumes).
- The provision of any specialised on-site first aid or assistance that may have to be administered.
- The provision and location of specialised equipment required including firefighting materials, safety showers, eye wash stations, chemical spill kits and neutralising agents.
- Locations of the hazardous chemicals, personnel and equipment and emergency control rooms at the workplace e.g. mark these locations on your site plan.
- Evacuation arrangements that take into account possible airborne dispersal of the hazardous chemical e.g. wind direction- i.e. plan several alternate routes.
- The limits of on-site action prior to seeking assistance from emergency services agencies.
- Emergency service agencies, any mutual resources involved and liaison arrangements between them.

Note: For DoE workplaces that use, store or handle hazardous chemicals in excess of manifest quantities listed in of the WHS Regulation 2011, Schedule 11 (see Chapter 4 and appendix 4f of this Guideline), an emergency plan **must** be provided to the primary emergency services agency.

7.1 Emergency procedures

As a minimum, emergency procedures should include instructions on:

- understanding what a high risk spill is and what a low risk spill is and how to manage these;
- how to raise the alarm, including how to contact the appropriate emergency services organisation;
- any actions to be taken by workers in an emergency to ensure the safety and health of all persons at the workplace to minimise risks, damage to property as well as the environment; and

- any actions to be taken by designated persons such as fire wardens e.g. how to evacuate the workplace or use fire extinguishers.

An example of an effective emergency procedure is a simple one-page document; in point form, suitable for display on signs or to be carried by workers or visitors as a pocket card, detailing:

- evacuation procedures;
- assembly areas;
- identifying first aid officers and emergency wardens at the workplace; and
- contact numbers of emergency services organisations (such as fire, police, ambulance, local hospital, energy suppliers and regulatory authorities).

The extent of emergency procedures required will depend on:

- the nature of the work being carried out at the workplace e.g. processes involved when the goods are in use;
- the nature of the hazards at the workplace; e.g. types and quantities of hazardous chemicals;
- the size, location and complexity of the workplace; and
- the number of workers, students and other persons at the workplace.

In the event of a leak, spill or uncontrolled release which involves the release of a type or quantity of a chemical **that poses an immediate risk to health or involves an uncontrolled fire or explosion**:

- Staff must notify the local fire warden.
- The fire warden assesses the situation, including where possible identifying the hazardous chemicals/s involved.
- The fire warden notifies the chief fire warden and advises the nature of the incident, steps being taken and assistance required.
- Chief fire warden contacts the appropriate emergency services e.g. ambulance/fire/police.
- Chief fire warden summons the emergency response team to implement emergency procedures.
- If necessary, first aiders attend to injured person/s as appropriate.
- Emergency response team cordon off the danger area and move people away from the immediate danger area as quickly as possible.
- If necessary, emergency response team to evacuate surrounding area/s.
- Await arrival of emergency services – do not return to the danger area until the ‘all clear’ is given by the emergency services.

If the leak, spill or uncontrolled release occurs outside a building, do not attempt to evacuate the workplace unless officially advised to do so by the emergency services.

In the event of a spill involving the release of a type or quantity of a chemical which does not pose an immediate risk to health and **does not** involve chemical contamination to the body:

- Notify personnel in the immediate vicinity of the incident.
- Isolate the area, close doors and evacuate the immediate area, if necessary.
- Remove ignition sources and unplug nearby electrical equipment.
- Vent vapours to outside of building only (open windows and turn on exhaust fans, if available).
- Locate spill kit.
- Choose appropriate PPE (goggles, face shield, impervious gloves, apron, etc.)
- Confine and contain spill.
- Cover with appropriate absorbent material - acid and base spills should be neutralized prior to clean-up.
- Sweep solid material into a plastic dust pan and place in a labelled, sealed container.
- Wet mop spill area - be sure to decontaminate broom, dustpan, etc.
- Put all contaminated items (gloves, clothing, etc.) into a sealed container or plastic bag.
- Return spill kit to storage location and arrange for used contents to be replaced.
- Inform your supervisor and the floor fire warden.

Every workplace that uses chemicals should have access to a spill control kit/s strategically located in fixed locations so they will be easily accessible. Spill kits can be purchased through most supply vendors that sell chemicals or safety supplies.

A list of recommended items for a chemical spill kit is contained in Appendix 7a. You can print this out and include this with your kit. You may need to modify it to ensure it is tailored to meet the specific spill control needs of your location. Spill kits should be checked periodically, and restored after each use.

If an injured person requires first aid, the following procedures should be implemented:

- Delegate people to obtain the safety data sheet (SDS):
  - follow the first aid instructions on SDS; and
  - give a hard copy of SDS to medical staff.
- For chemical splashes to the eye:
  - flood the eyes with water (use the eye wash station, if available); and
  - continue to flood with running water for 20 minutes BY THE CLOCK and seek medical attention if required.
- For chemical splashes to the skin:
  - irrigate the skin with running water for 20 minutes BY THE CLOCK and seek medical attention if required.

A record of the incident is to be made (e.g. MyHR WHS for schools) which notes the actions taken to rectify or prevent reoccurrence.

7.2 Emergency equipment and safety equipment

The type of emergency equipment required to respond to an emergency or spill will vary depending on the type and quantities of hazardous chemicals at the workplace.

Equipment must be located so it is readily accessible if an emergency arises. Examples of emergency equipment that may be required in your workplace range from preventative and alert systems to specific items for chemical clean up including but not limited to:

- fire protection systems – fire extinguishers, automated sprinklers, foam sprays, effective monitors and alarms;
- reliable water supply;
- booms, plates and/or flexible sheeting for preventing spillage from entering drains and waterways;
- secondary containment such as oversized drums for holding leaking containers;
- spill kits appropriate to the type of chemicals used including mops, buckets and squeegees;
- first aid kits relevant to the chemical risks e.g. antidotes for specific chemical exposures such as fluorides and phosphorus burns;
- emergency showers and/or eye wash stations; and
- suitable protective clothing and equipment to prevent exposure during clean-up tasks.

7.3 Emergency service agencies

Emergency service agencies should be able to access information on the hazardous chemicals present at the workplace such as the hazardous chemical register and emergency management plan. Documents that may assist emergency services to operate safely and effectively include:

- current chemical manifest and register of hazardous chemicals; and
- a scale plan of the workplace showing:
  a. location of hazardous storage areas;
  b. main entrances to the premises, as well as all secondary entry points;
  c. essential site services for emergency services (fire services, isolation points for power/fuel/gas);
  d. locations of drains; and
  e. nature of occupancy in adjacent premises.

Appendix 7a – emergency chemical spill kit

The contents of the chemical spill kit should be specific to the chemical or group of chemicals you may need to clean up. For example:

- oils and grease;
- fuels;
- solvents;
- agricultural chemicals;
- laboratory reagents (specific classes may require specialised kits or materials);
- acids and alkalis;
- general workshop chemicals; or
- body fluids.

⚠ **The size of a spill does not always determine the level of response required to manage the spill. The properties of some chemicals are such that even small quantities can pose extreme risk to people, property and the environment.**

⚠ **When a spill occurs, do NOT take any action that threatens your own health and safety.**

⚠ **The clean-up of a chemical spill must only be done by personnel who have knowledge and training to respond appropriately and safely.**

Contents may include, but are not limited to:

Chemical absorbents such as:

- ☐ universal (inert) spill absorbent such as unscented, non-clumping kitty litter (diatomite), vermiculite, clay and sand These all-purpose absorbents are suitable for most chemical spills including solvents, acids, and bases;
- ☐ acid spill neutralizer – sodium bicarbonate, sodium carbonate, or calcium carbonate;
- ☐ alkali (base) neutralizer – sodium bisulphate;
- ☐ solvents/organic liquid absorbent – inert absorbents such as vermiculite, clay, sand or Oil-Dri; or
- ☐ bromine/iodine/silver nitrate neutralizer – 5% solution of sodium thiosulfate and inert absorbent.

Personal protective equipment (PPE) such as:

- ☐ safety goggles and face shield;
- ☐ heavy neoprene gloves;
- ☐ disposable lab coat or apron or corrosive apron;
- ☐ plastic vinyl booties; or
- ☐ fit tested dust mask/respirator.

Clean-up material such as:

- ☐ plastic dust pan and scoop;
- ☐ plastic bags for contaminated PPE; or
- ☐ plastic bucket (polyethylene) with lid for spill and absorbent residues.

Safety advisory materials:

- ☐ barrier tape;
- ☐ warning signs; or
- ☐ permanent marker pen and/or sticky labels for labelling disposal containers.

Other considerations:

- aspirator bulb and decontaminating powder for mercury;
- dry sand for alkali metals (sodium, potassium) and acid chlorides; and
- booms or drain guards (e.g. flexible plastic sheeting to prevent spillages from entering drains and waterways.

Chapter 8: glossary

8.1 Glossary

Administrative controls	Systems of work or safe work practices designed to prevent or reduce the risks from hazardous chemicals.
Australian Dangerous Goods (ADG) Code 7	Australian Code for the Transport of Dangerous Goods by Road and Rail 7th Edition.
Biological monitoring	Testing for the presence of a hazardous material, its metabolites or a biochemical change in a person's body tissue, exhaled air or fluid.
Chemical name (product identifier)	is the scientific or technical name of a chemical as listed on the SDS.
Chemicals	The overarching term used in this document for substances composed of elements, compounds or complexes present as an entity or contained in a mixture.
Compound	A substance formed by the chemical union of two or more elements
Container	A thing, other than a bulk container, or tank, defined in the ADG Code, in which a chemical is, or has been, completely or partially cased, contained, covered, enclosed or packed, but does not include an enclosed system.
Contaminant	Any substance that may be harmful to health or safety
Dangerous goods	Dangerous goods are substances, mixtures or articles that, because of their physical, chemical (physicochemical) or acute toxicity properties, present an immediate hazard to people, property or the environment.
Element	A fundamental substance comprising one kind of atom (the simplest form of matter).
Engineering controls	Physical controls designed to prevent or minimise risks from hazardous chemicals.
Flash point	The temperature at which a liquid can produce enough vapour to ignite in the presence of an appropriate ignition source.
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
Hazard	A thing or a substance with the potential to cause harm to people, property or the environment.
Hazard category	A division of criteria within a hazard class in the GHS
Hazardous chemical	A substance, mixture or article that satisfies the criteria for a hazard class in the GHS
Hazard class	The nature of a physical, health or environmental hazard under the GHS
Hazardous materials	A substance that, because of its chemical, physical or biological properties, has the potential to cause harm to people, property or the environment.
Hazard pictogram	The black symbol or 'picture' on a white background within a red diamond frame which represents a hazard class or hazard category according to the GHS.

Hazard statement	A statement assigned in the GHS to a hazard class or hazard category describing the nature of the hazards of a hazardous chemical including, if appropriate, the degree of hazard.
HAZCHEM code	The emergency action code developed and assigned to hazardous chemicals used to help emergency services to take action quickly in any accident. The code consists of a number followed by one or two letters. The number indicates the type of substance to be used in treating the accident. The first letter indicates the type of protective clothing needed along with information about the possibility of violent reaction. The second letter, where it exists, indicates if people have to be evacuated from neighbouring areas.
Health monitoring	Monitoring of a person to identify changes in the person's health status because of exposure to particular substances.
Hierarchy of control	A list of control measures, in priority order (sequence of options) which can be used to eliminate or minimise exposure to hazards.
Label	Written, printed or graphical information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the container of a hazardous chemical.
Placard	A sign that provides a visual warning of the hazards associated with the hazardous chemical at the premise (outer placarding) and in each building or other facility (inner placarding) where dangerous goods are stored or handled
Precautionary statement	A phrase prescribed by the GHS that describes measures that are recommended to be taken to prevent or minimise: (a) the adverse effects of exposure to a hazardous chemical; or (b) improper handling of a hazardous chemical.
Risk	The likelihood that a hazard will cause harm to people, property or the environment.
Risk assessment	A process of evaluating and controlling the probability of an injurious event (related to the purchase, use or exposure to a hazard) and the extent of injury or illness that may result if that event occurs.
Safety data sheet (SDS)	A document that describes the identity, chemical and physical properties, health and environmental hazard information, uses, precautions for use, safe handling procedures and safe disposal procedures of a hazardous chemical.
Significant risk	Means that the work being undertaken with a hazardous chemical is likely to adversely affect the health of workers and other persons at the workplace. For example, there would be a 'significant risk' if: ▪ the health effects from exposure to the hazardous chemical are substantial; ▪ there are no control measures in place at the workplace or the controls that are in place are not adequate to protect workers from exposure to a hazardous chemical; or ▪ the level of exposure is high.
Substance	Any natural or artificial compound, whether it is solid or liquid form or in the form of a gas or vapour.
Use	Includes handling, production, storage, movement, application and disposal of a substance.

8.2 Additional resources

Department procedures and guidelines

- Managing risks with chemicals in Department of Education (DoE) workplaces
- Managing risks in school curriculum activities
- Health and safety incident management
- First aid
- Infection control
- Electrical safety guide

Further information

- Work Health and Safety Regulation 2011 (Chapter 7 Hazardous Chemicals)
- Managing risks of hazardous chemicals in the workplace Code of practice 2013
- Labelling of workplace hazardous chemicals Code of practice 2011
- How to Manage Work Health and Safety Risks Code of practice 2011
- Preparation of safety data sheets for hazardous chemicals Code of practice 2011
- *Australian dangerous goods code road and rail 2010 (ADG7 Code)*
- *Manifest requirements for hazardous chemicals under the Work Health and Safety Act 2011*
- Managing risks of plant in the workplace Code of practice 2013

Contacts

For further support with risk management training and advice contact trained staff such as your:

- Workplace health and safety advisor (HSA)
- Health and safety representative (WHSR)
- Regional senior health and safety consultant, and
- the Creating healthier workplaces website.